FOUNDRY TRADE JOURNAL

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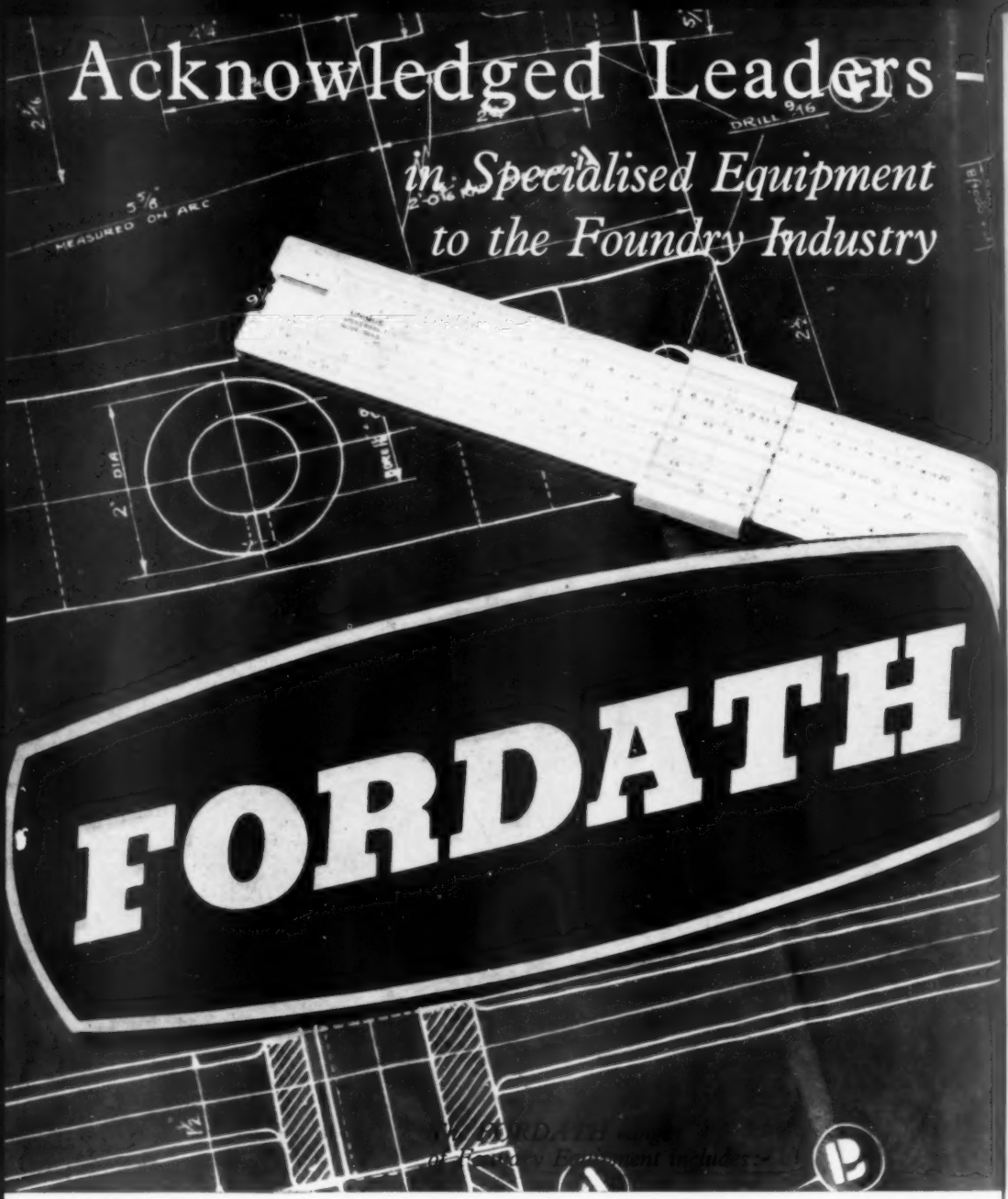

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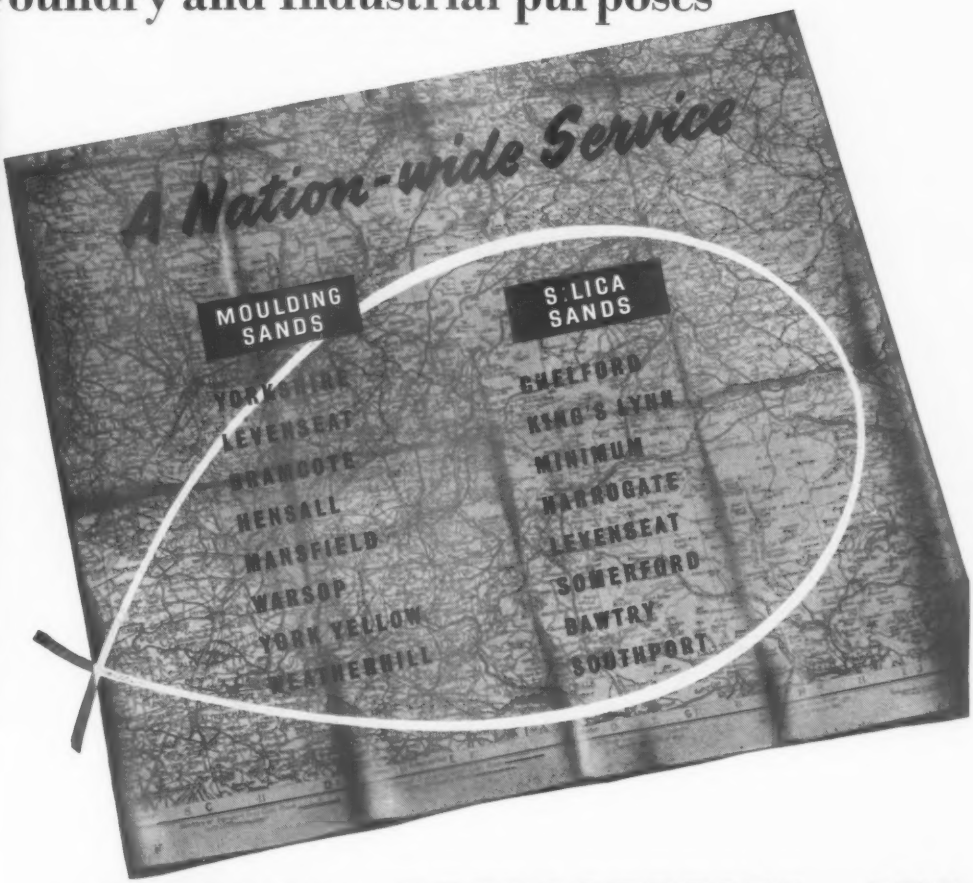

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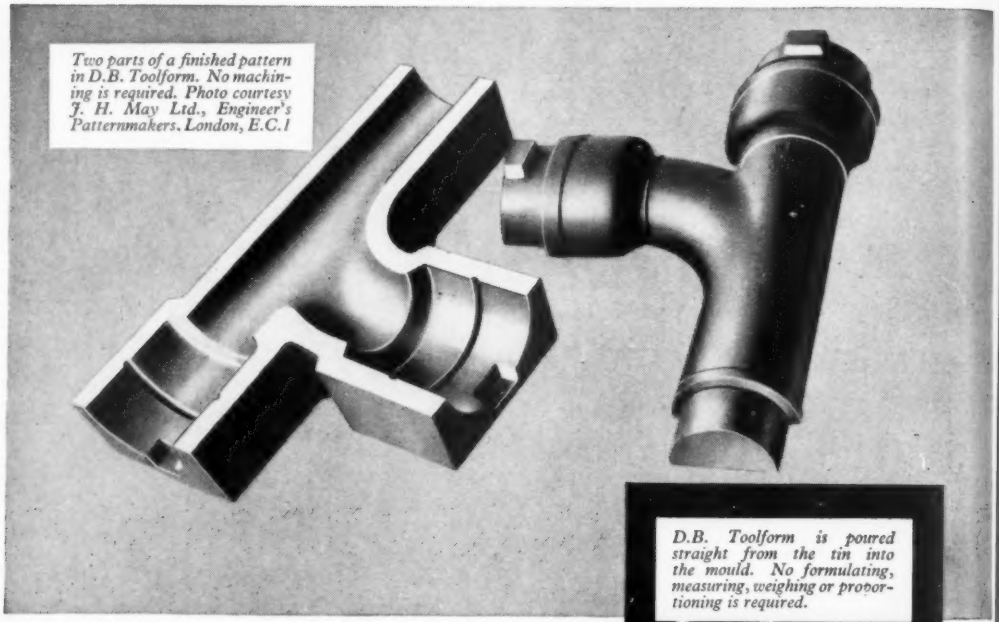

Two parts of a finished pattern in D.B. Toolform. No machining is required. Photo courtesy J. H. May Ltd., Engineer's Patternmakers, London, E.C.1

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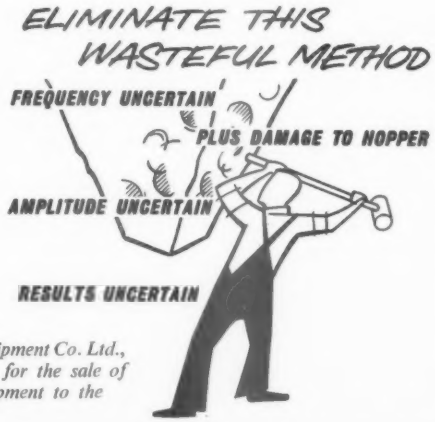

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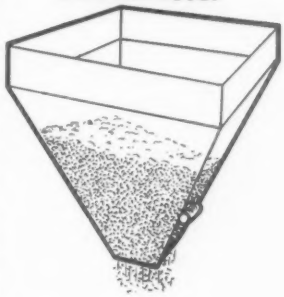
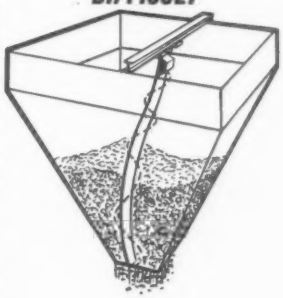


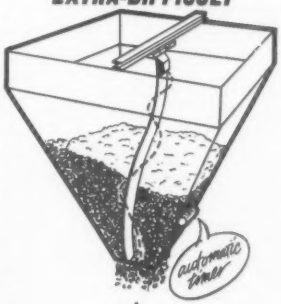
The installation of an external vibrator to a steel hopper.

DIFFICULT



The vibrating reed for application where external vibration is impractical due to structural or other difficulties and if the bunker is made of concrete.

EXTRA-DIFFICULT



A combination of internal and external bunker vibration. Where the external vibrator is timed for 'on and off', the vibration frequency, on slowing down, goes through the natural resonance of the bunker, irrespective of load material contained.

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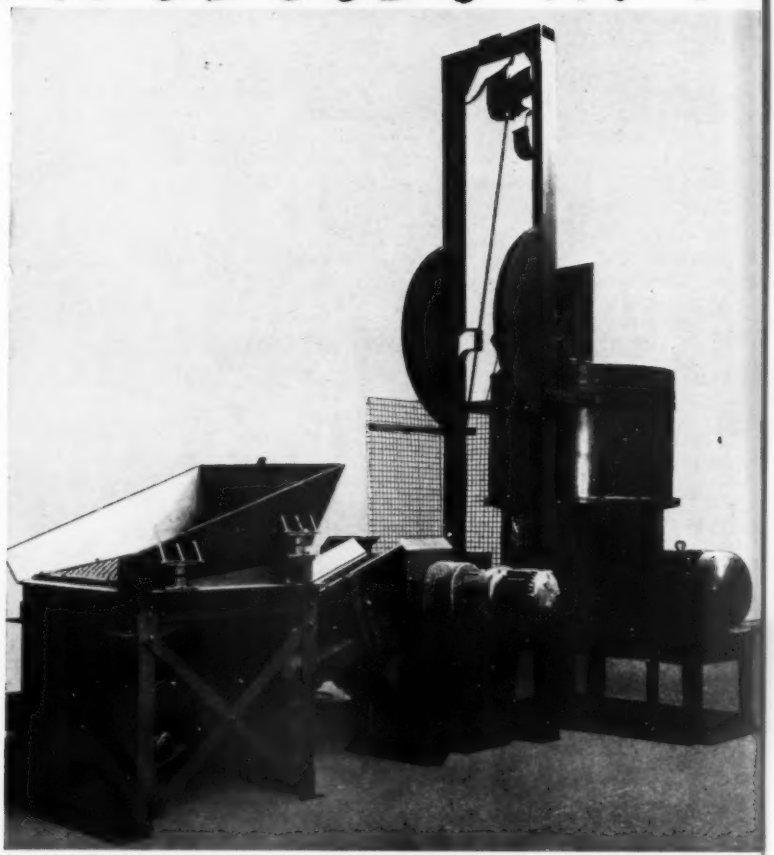

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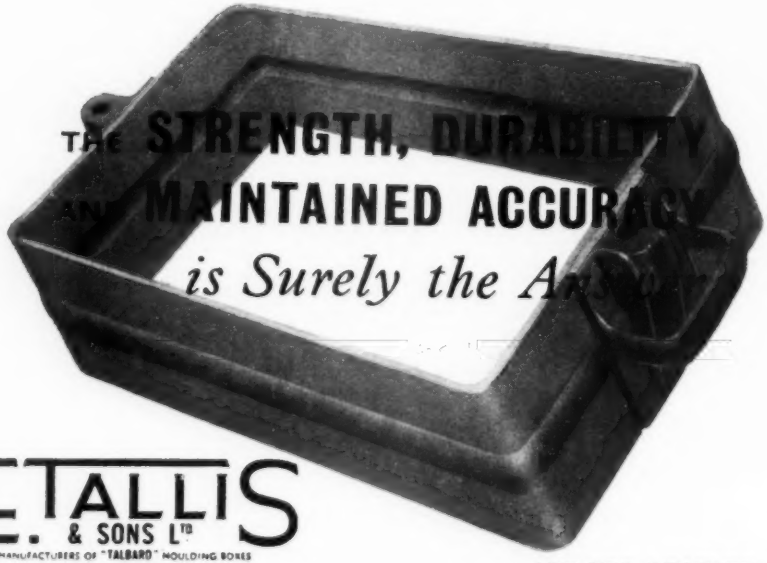

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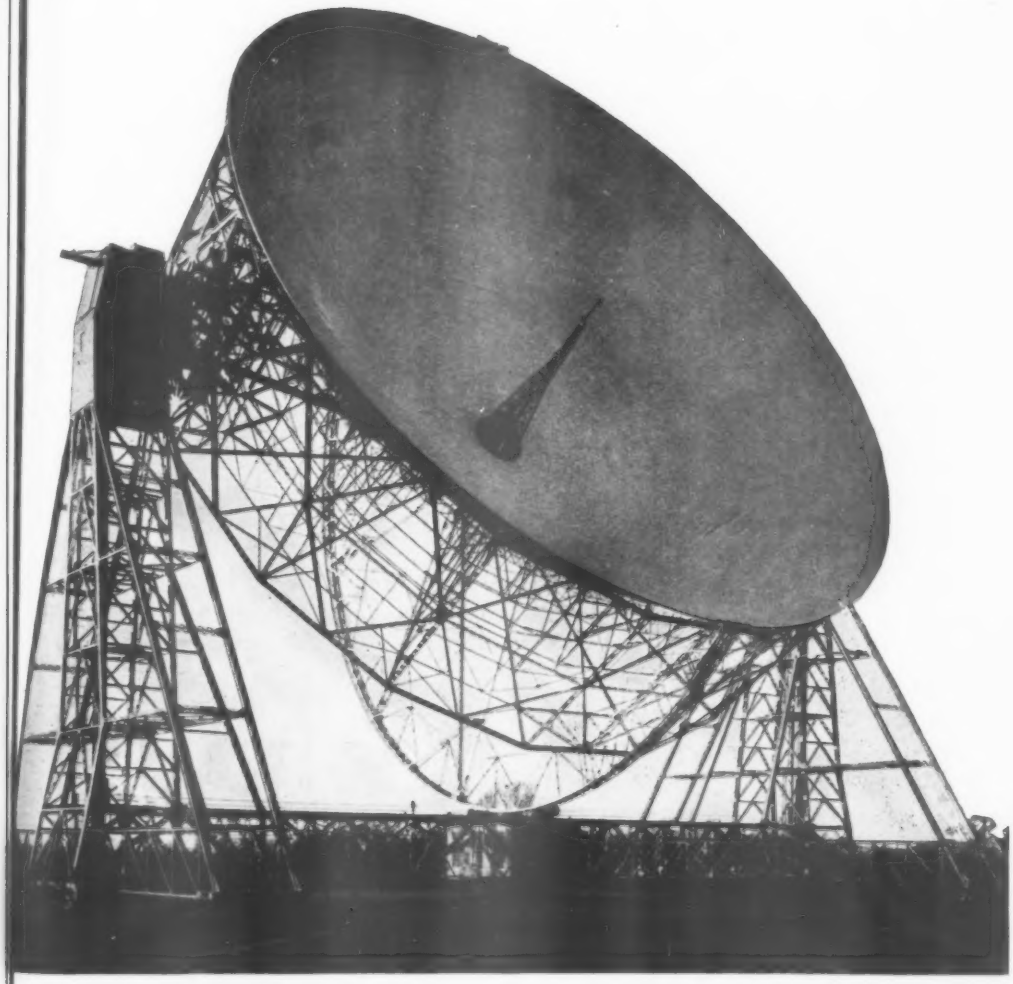

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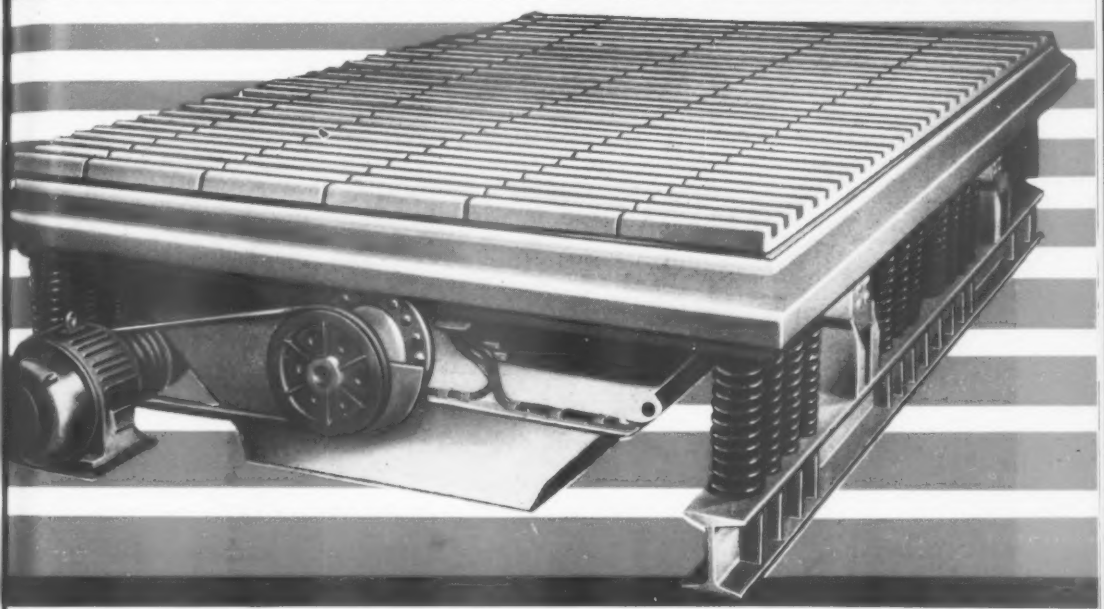

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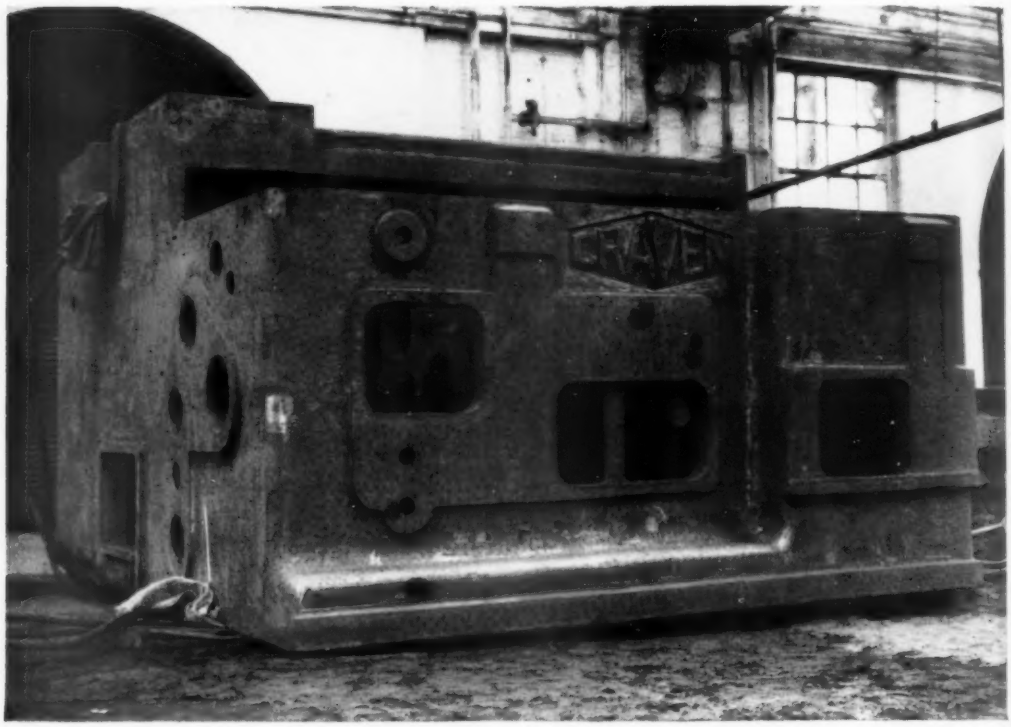

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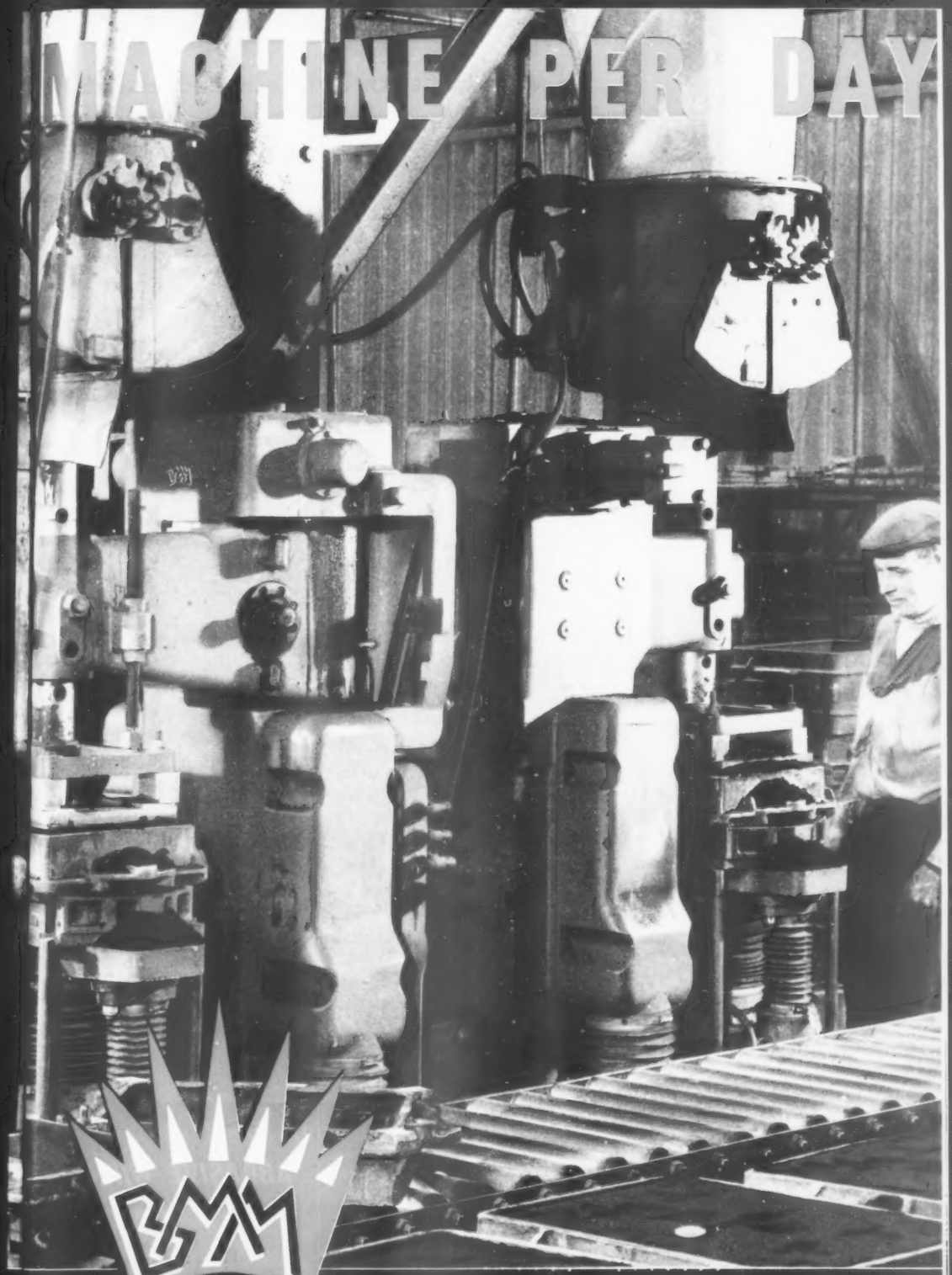
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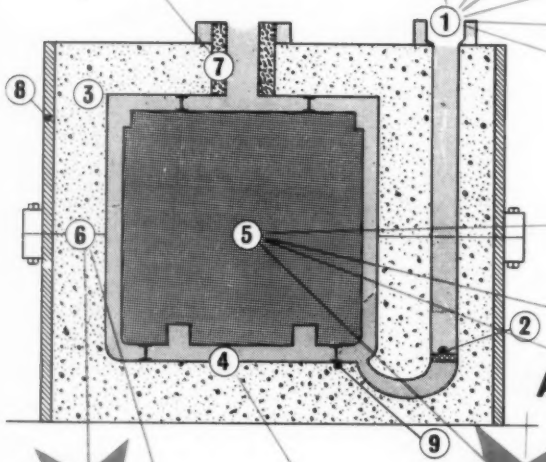

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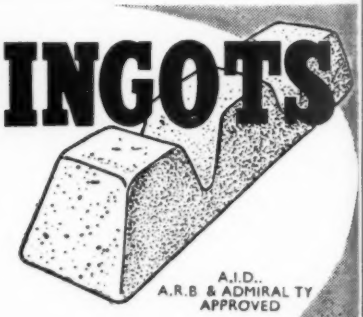

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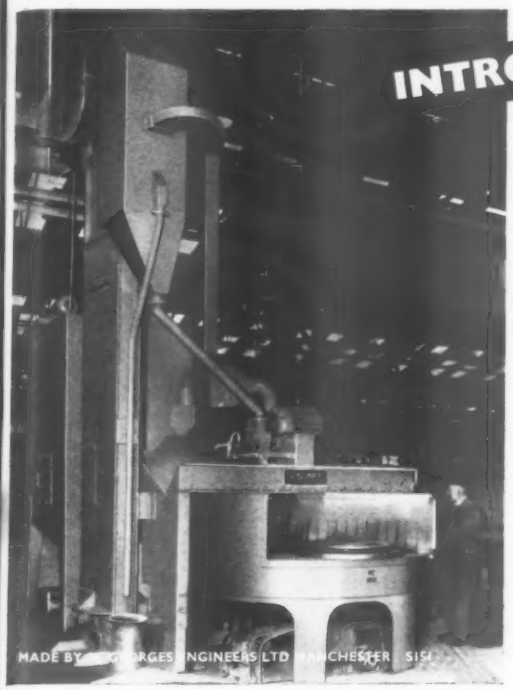

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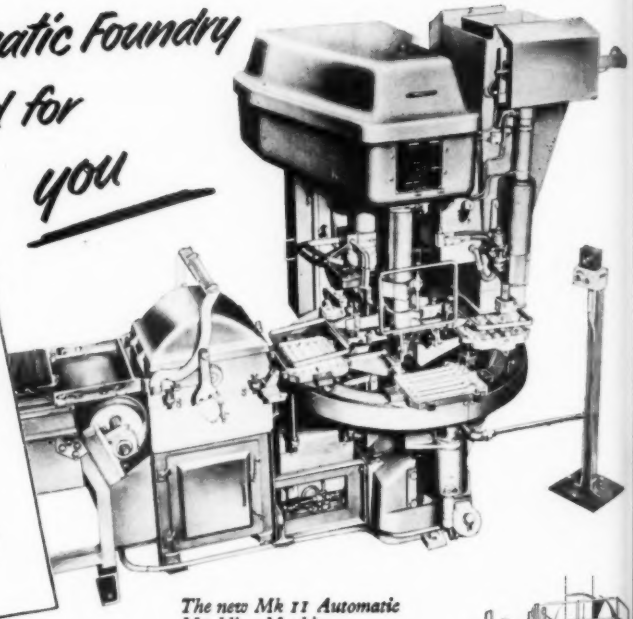

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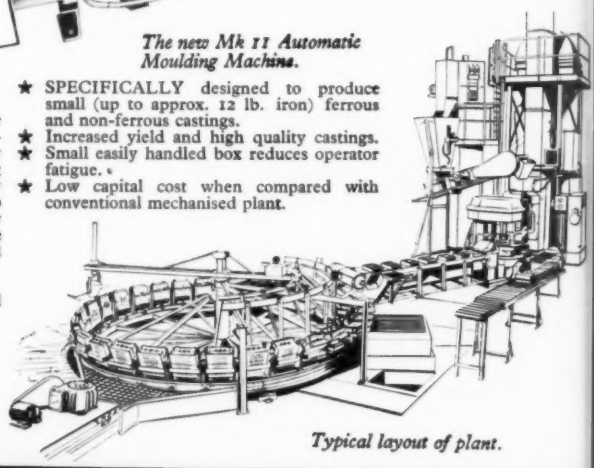

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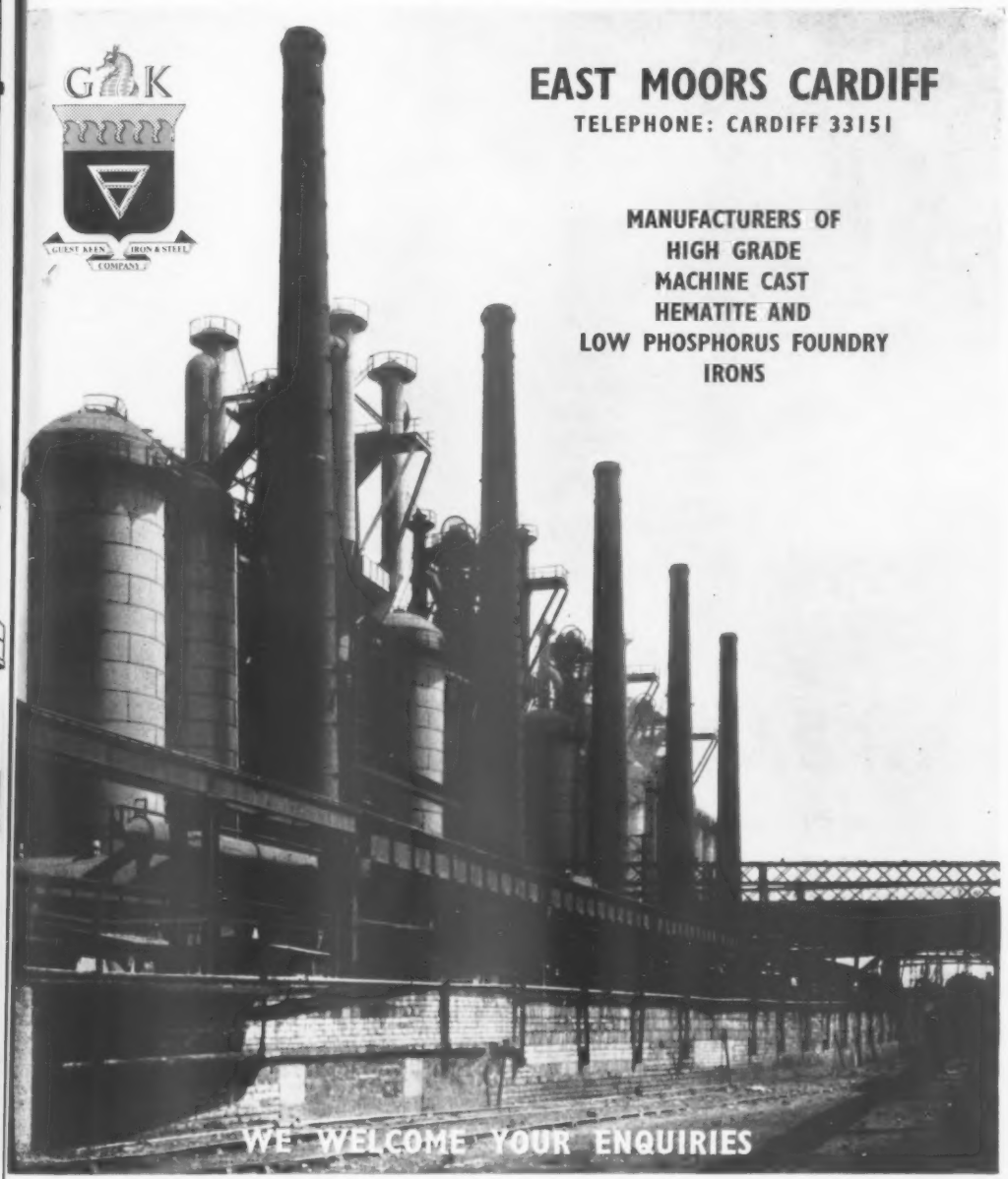

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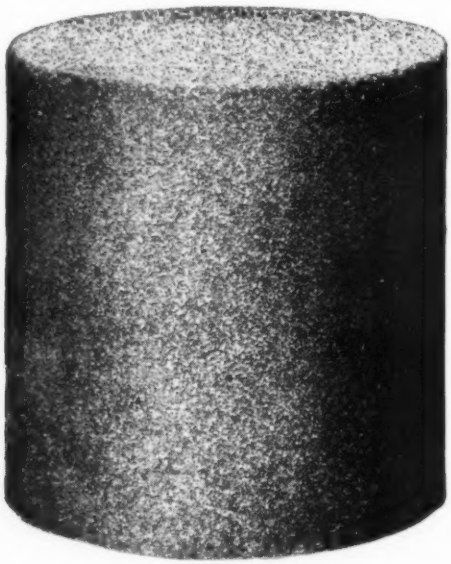

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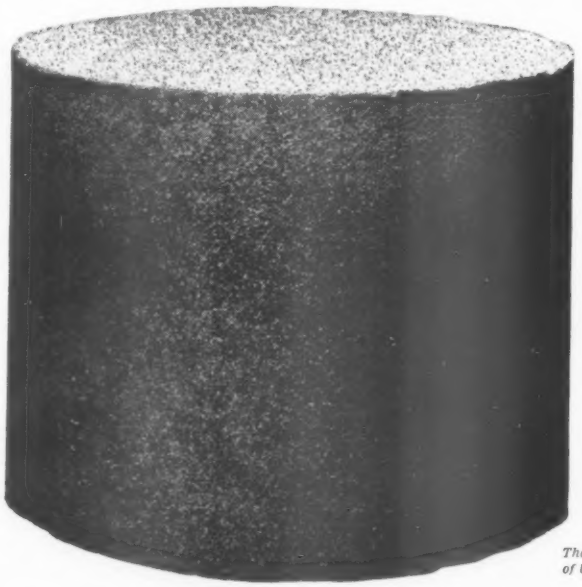

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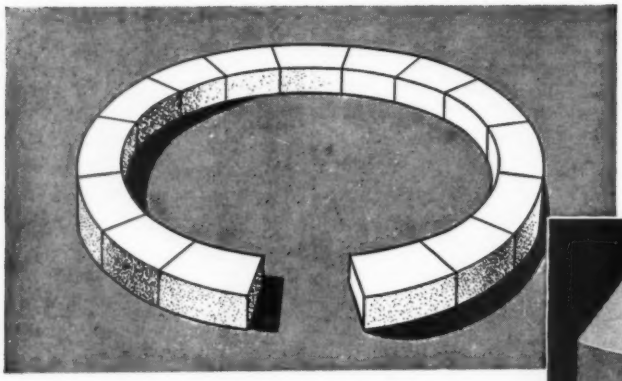

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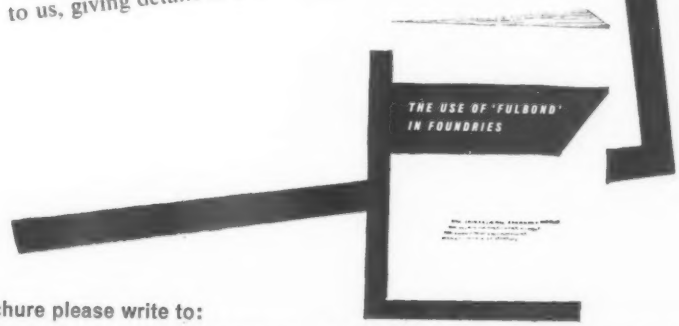

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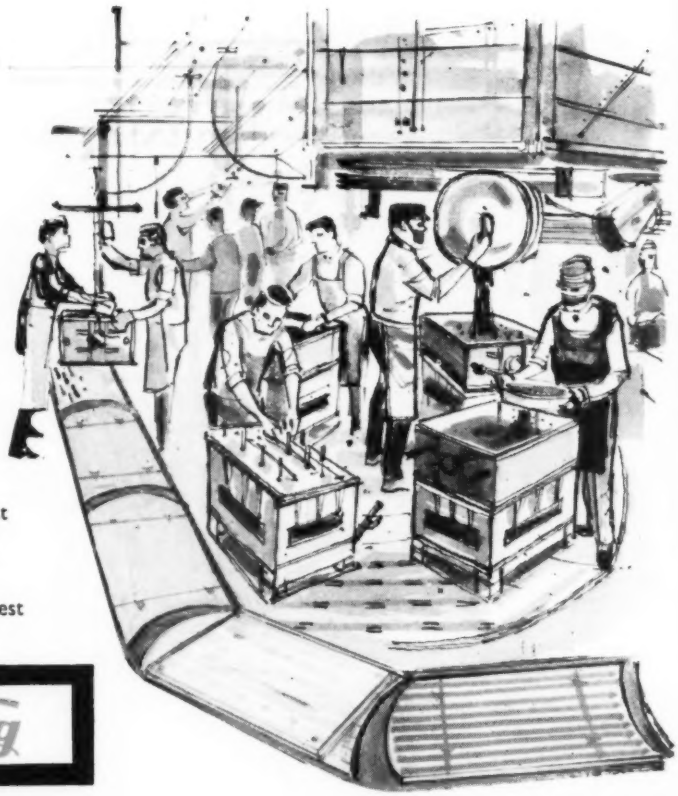

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FOUNDRY TRADE JOURNAL

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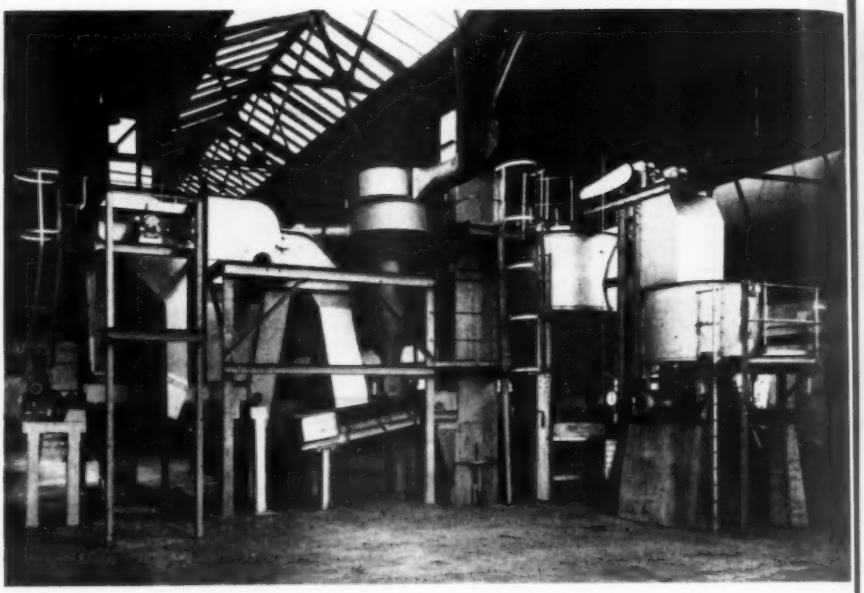

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FOUNDRY
TRADE JOURNAL

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The 1959 Factory Report

Mr. T. W. McCullough, O.B.E., H.M. Chief Inspector of Factories, in his Annual Report for 1959* states that, at 598, the number of fatal accidents last year was the lowest recorded this century. It was 67 fewer than in 1958. There was, however, a disappointing reversal in the downward trend of the three previous years in the total of industrial accidents. A new code of reporting has been evolved and in this system foundries instead of being totalled under " metal founding " are given under the headings of ironfounding, steelfounding, die-casting and non-ferrous metal casting. In these four sections, there was a total of 11 fatal accidents, which compares favourably with the 17 entered under metal founding in 1958. The industrial accidents, however, totalled 8,351—5,962 for iron; 1,164 for steel, 350 for die-casting and 875 for non-ferrous casting, showing a serious increase of 531 over 1958 figures—though it may be that the comparison is not valid due to the change in the reporting method.

Mr. McCullough commenting on the happy reduction in the number of fatal accidents, puts forward the view that it could be reflection of the reduced severity of the industrial accidents reported as a whole. The use of both mechanical and hand-operated transport vehicles in industry was last year responsible for 25 fatalities and 3,869 accidents, and the Chief Inspector suggests in this section that each factory should institute its own " highway code " as a means of ensuring accident reduction. Once again, a plea is made in the Report for the general use in industry of safety boots and suitable headgear. In the future, it is hoped to supply in the Report figures for each industry which relate the victim's working process to the part of the body injured. Only a small section of the Report is devoted to the foundry industry. For the non-ferrous foundry, an efficient method of controlling fumes arising from crucibles of molten metal has been developed and an innovation in reverberatory furnace design is noted.† For iron foundries it is pointed out that the drying of ladles either electrically or by gas reduces fumes and is more efficient. In the steel foundry, though powder-washing and carbon-electrode methods of fettling are quoted as dustless processes, they do give rise to hot fumes which should be evacuated from the shop.

It is most desirable that industrial executives should study this Report as there are so many facets to accident prevention that it is easy to lose sight of some of them. To help to understand the figures collected, the Ministry of Labour has published at a cost of 4s. 0d. net, a " Guide to Statistics collected by the Factory Inspectorate." It clarifies many points, such as if a man in falling from a ladder, injures a second man, both accidents are classified as a " fall from a ladder," and puts forward the sensible notion that accidents must be traced back to their sources. In substance, therefore, the Chief Inspector's Report is one of progress in the reduction in severity of accidents but not in total numbers, the increased incidence of accidents among young people in industry warranting increased vigilance. Nowhere is there any excuse given for relaxed supervision, either of safety officers, or individual employees.

* Annual Report of the Chief Inspector of Factories for 1959, obtainable from H.M. Stationery Office or any bookseller, price 7s. net.
† See JOURNAL August 18, 1960.

Mr. A. Parrott retires

Mr. Albert Parrott, the well known art bronze founder, who retired in August from the position of foundry manager of the Morris Singer Company, Limited, London, S.W.8, after nearly 40 years' service, is shown below receiving a citation and presentation from his colleagues. Amongst these were a coffee table, garden chairs, and tea-making equipment. Also in the picture (right) is Mr. A. Wizard, a director of

Morris Singer, who has been associated with Mr. Parrott for a number of years. Mr. Parrott will continue to be associated with the company as a consultant.

Forthcoming Events

(The Editor would be pleased to receive from the secretaries of the various technical associations details of their programmes for the 1960/61 session, for inclusion in this column).

SEPTEMBER 26

Institution of Plant Engineers

West and East Yorkshire branch: "Fuel—Economy and Productivity," by K. Higginson, 7.30 p.m., at the Houldsworth School of Applied Science, Leeds University.

SEPTEMBER 27

Combustion Engineering Association

North-western region: "Modern Fuels and their Application," by D. C. Gunn, 2.30 p.m., at the Engineers' Club, Albert Square, Manchester.

Institute of British Foundrymen

Stoke-on-Trent section: Evening visit to the Goodyear Tyre & Rubber Company, Limited, Wolverhampton.

Institution of Plant Engineers

Sheffield and district branch: "Maintenance Problems in a Nuclear Power-station," by J. R. Treharne, 7.30 p.m., at the Grand Hotel, Sheffield.

SEPTEMBER 28

Institute of British Foundrymen

Birmingham branch: Presidential address followed by "Use and Abuse of Moulding Machines," by C. M. Stoch, 7.15 p.m., at the James Watt Memorial Institute, Great Charles Street.

London branch: Presidential address "Accident or Design? . . . A Story of Foundry Planning," 7.30 p.m., at the Constitutional Club, Northumberland Avenue, W.C.2.

OCTOBER 1

Institute of British Foundrymen

West Riding of Yorkshire branch: Works visit to the Renishaw Iron Company, Limited, near Sheffield, 11 a.m. to 3.30 p.m. (approx.).

National Foundry Craft Training Centre Appeal

A total of £12,888 9s. has now been subscribed towards the £100,000 appealed for last May by the National Foundry Craft Training Centre to meet the cost of rebuilding the Centre. The subscriptions listed below are in addition to those reported in the July 7 issue of the JOURNAL.

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Brightside Foundry & Engineering Co., Ltd.	300	0	0
Storey Foundry Co., Ltd.	25	0	0
Seagers, Ltd.	25	0	0
McGregor Brothers, Ltd.	5	5	0
Audley Engineering Co., Ltd. (Leach Sixth Trust)	100	0	0
Ferranti, Ltd. (Second donation) (Total £220)	120	0	0
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AT THE DERBY FACTORY of Rolls-Royce, Limited, whose engines powered the "Spitfires" and "Hurricanes" used in the Battle of Britain, a lunch hour Remembrance Service for the Battle of Britain was conducted by the Bishop of Derby, the Rt. Rev. Geoffrey Allen, on September 15. Amongst those present were many of the company's directors and the Mayor of Derby, Councillor W. Andrews.

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Influence of Increased Lead Content on Pressure-tightness of Leaded Gunmetal*

By Lars Ekbom

The following paper delivered at the International Foundry Congress at Zurich this week deals with experiments conducted in Sweden to continue previous research which seeks to explain the good "castability" of leaded gunmetal. The Author describes his own experiments and those of his colleagues and applies the results in substantiation of a further theory.

Most metals shrink during solidification and this shrinkage may cause cavities in castings if it is not compensated for by metal supplied from feeder-heads. However, in the case of alloys having wide freezing-ranges, e.g., tin-bronzes and gunmetals, good feeding is difficult to obtain throughout the solidification process. In such alloys, harmful cavities may occur, which reduce the pressure-tightness of castings made from them. The defects can be avoided by: (a) Utilizing the mould-reaction phenomenon, or (b) by a lead addition.

During mould-reaction, the gas evolved can compensate for freezing shrinkage and cause pores to be distributed in a less-harmful way. But for pressure-tight castings in copper-base alloys, the most common alloy adopted is leaded gunmetal of the composition Cu/Sn/Zn/Pb, 85/5/5/5. In this alloy, lead is considered to promote soundness, a fact which has been shown in many reports. Baker, Child and Glaisher[1] have determined the soundness of discs cast in three copper alloys containing: Sn 10, and P 0·7; Sn 8 and Zn 4, and Sn 5, Zn 5 and Pb 5 per cent. From these alloys, the leaded gunmetal was low in porosity all over the disc, whilst the other two, especially the phosphor-bronze, showed porosity in the centre of the disc (Fig. 1). The better soundness of leaded gunmetal was explained by the presence during late stages of solidification of a lead-rich constituent having a low melting-point, which contributes to an improved feeding ability of the whole mass of solid plus melt.

In the discussion of his paper, Baker[2] points out that "it may be that the explanation which we have put forward is correct, but certainly for some reason it seems that, under poor conditions of feeding, the leaded alloys do contain far less porosity than the lead-free alloys."

Hudson[3] says that a gunmetal containing tin 7, zinc 5, and lead 5 per cent., with the balance copper, appears to be more suitable for the production of pressure-tight castings of varying section than lead-free or low-lead-content alloys. Kura and Eastwood[4] have shown that an alloy 81/3/7/9, containing 7 per cent. Pb, has better pressure-tightness and fewer microporosities and shrinkage cavities than the 85/5/5/5 alloy, also when different melting furnaces, gating systems and pouring temperatures are employed.

It thus seems proved that an addition of lead to gunmetal increases pressure-tightness. It is, however, not clear how this quality is influenced by an increase in lead content above the nominal 5 per cent. Therefore the committee concerned with casting of copper alloys, within *Sveriges Mekanförbund*, considered it to be of interest to investigate higher lead contents in gunmetal 85/5/5/5. The experiments have been carried out at the ASEA concern and complemented by some volume-change determinations to test a theory on the mechanism of solidification in leaded alloys. These experiments have been checked at the Swedish Institute for Metal Research by Malmberg, who used somewhat different methods.

THEORY

To explain the influence of the lead content on the pressure-tightness of castings, a theory has been proposed by the author. It is based on consideration of the volume change connected with the separation of a lead-rich molten constituent during solidification.

Solidification of Gunmetal

The solidification of an alloy with a broad freezing-range starts at the metal/mould interface, where crystals grow from the interface towards the interior of the casting (Fig. 2). Before these crystals have grown very far, new crystals are formed within the melt. These free crystals with the metal that is still molten compose a mixture

* Official exchange paper from *Sveriges Mekanförbund* (the Swedish Association for Metal Transforming, Mechanical and Electrochemical Engineering Industries), presented this week at the Zurich Foundry Congress. The Author is assistant to Mr. L. Millner, within the Foundry Section of the Swedish Association.

Pressure-tightness of Leaded Gunmetal

having a mushy consistency, which can move as a mass within the outer sheel of crystals. The solidification shrinkage during this first stage (stage 1) can be compensated as a result of the movement of the whole mass of molten metal and the free crystals (" mass feeding ").

The free crystals grow successively, and as they touch each other a solid " skeleton " is formed, which is surrounded by residual melt. The melt can then move only in channels between the crystals. The solidification shrinkage during this stage (stage 2) can be compensated by residual melt moving in the channels. This can be called " channel feeding." Baker[5] says that different observations indicate that stage 2 begins when about 60 per cent. of the casting is solidified.

Generally speaking, good feeding can easily be obtained during the first stage of solidification but is more difficult to obtain during the second stage. Absence of feeding will cause macro-cavities during stage 1, while during stage 2 it will result in micro-shrinkage. In castings of *varying section-thickness*, the feeding channels of thinner sections will be cut off fairly early during solidification, whereby feeding can no longer take place in these sections. Shrinkage is then compensated by the movement of melt from late-freezing to early-freezing parts of the casting, so that channel-shaped shrinkage cavities are formed in late-freezing parts, causing reduced pressure-tightness of the casting.

Separation of a Lead-rich Constituent in Leaded Gunmetal

It is now suggested that the shrinkage during the second stage is reduced by the presence of lead, due to a separation of a molten lead-rich constituent. Thus, first it has to be shown that a separation of lead-rich constituent actually occurs during the second stage of solidification. For this purpose, it is convenient to consider the Cu/Sn/Pb constitutional diagram—the presence of zinc in the alloy does not radically change the solidification process under consideration.

According to the equilibrium diagram (Fig. 3), an alloy with Cu 90 per cent., Sn 5 per cent., and Pb 5 per cent. starts to solidify by separating α crystals containing 1 to 2 per cent. tin and no lead. These crystals grow with a continuous increase in tin content while the melt also is enriched in tin and lead until the two-liquid miscibility limit is reached, when according to the diagram, about 73 per cent. of the melt has solidified. Bearing in mind segregation and the presence of zinc, however, only about 65 per cent. of the melt will actually be solid. At this point, the residual melt, containing Sn 11 per cent., Pb 18 per cent., is beginning to transform monotectically into α crystals and lead-rich constituent, containing moderate amounts of copper and tin. The monotectic separation of the lead-phase starts at about 900 deg. C. and continues to 770 deg. C. Simultaneously the α crystals grow further. Finally, at about 770 deg. C. the monotectic solidification ends by the formation of β phase, which is later transformed into α and δ phases. The lead-rich constituent is continually depleted in copper and tin and finally solidifies at about 300 deg. C.

Metallographic Study

To confirm this solidification mechanism, a metallographic examination was made. In Figs.

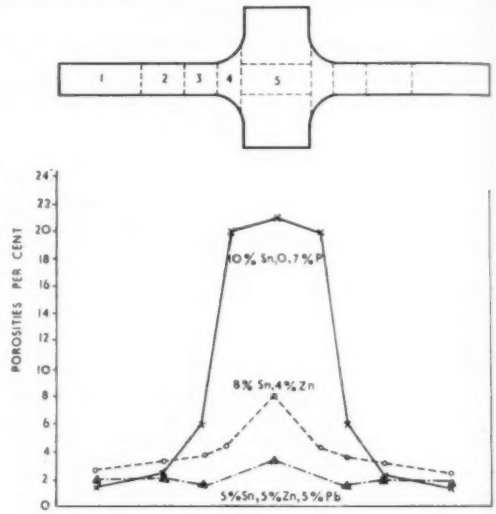

FIG. 1.—*Percentage of shrinkage porosity in different parts of a disc, cast in three copper alloys (Baker, Child, Glaisher[1]).*

4 and 5, the structure of cast 85/5/5/5 alloy, etched by two different etchants is shown. In Fig. 4 the early-solidification part of the α phase (about 50 per cent.) is darker etched; the lead phase is separated as isolated inclusions in the light, later-solidified part of the α phase. In Fig. 5 only the last-solidifying part (15 per cent.) of the α phase is etched. The lead-phase is situated mainly in the unetched part of the α phase. This shows that the lead-phase separated after 50 per cent. solidification but mainly before 85 per cent. of the melt had solidified. The lead-phase is included in the growing α phase. From these observations, it is obvious that the separation of a lead-rich molten constituent occurs during the second stage of freezing.

Experiments to Determine Volume Change at the Monotectic Reaction

It is to be assumed that the monotectic transformation of the melt into α crystals and the lead-rich constituent occurs without considerable volume change. To show this, the author made experiments to determine the freezing shrinkage of a monotectic melt of copper and 40 per cent. lead. For comparison, the shrinkage of pure copper and an alloy of Cu 80 per cent. and Pb 20 per cent. also

were examined. The shrinkage was determined according to a method developed by Honda.[6 7] In this, a crucible containing the metal is immersed in

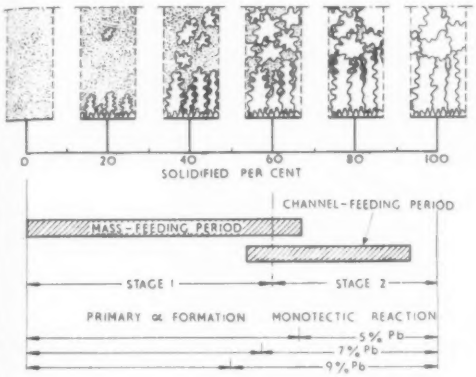

FIG. 2.—*Schematic representation of the freezing process of a leaded gunmetal. The crystal formation is shown at different moments of the solidification of a casting. The type of feeding that may occur and the range for monotectic reaction at various lead contents are indicated.*

a molten salt and the volume change during melting is measured by apparent loss in weight in accordance with Archimedes' principle. The results of

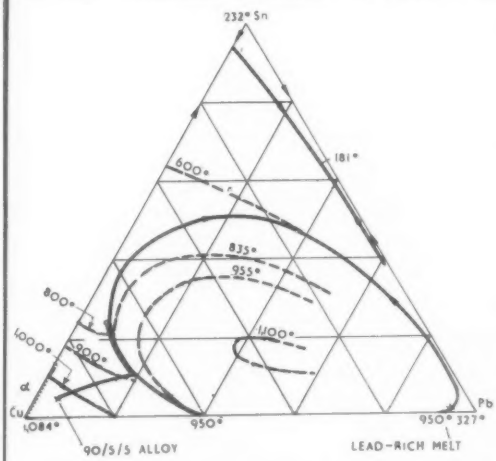

FIG. 3.—*Equilibrium diagram for copper/tin/lead, according to Briesemeister*[10]. *(x—o change of composition of a 90/5/5 alloy melt during solidification.)*

these experiments, Fig. 6, were that the monotectic alloy with Cu 60 per cent. and Pb 40 per cent. melted without volume change, while copper showed normal and the 80-20 alloy a rather small volume change.

At the suggestion of the author and the copper committee of *Sveriges Mekanförbund*, experiments have been pursued by Malmberg[8] who determined the specific volume with an accuracy better than ± 0·1 per cent. and showed that a monotectic melt of copper and lead transforms into α crystals and a lead-rich constituent without volume change. He even showed that further cooling and freezing of the lead-rich constituent is associated with an increase in volume. Malmberg has also determined the specific volume of four monotectic melts of Cu/Sn/Pb one of which had the same constitution as the 85/5/5/5 alloy despite the exclusion of zinc. As shown in Fig. 7, the total shrinkage at the monotectic transformation of an alloy Cu 90, Sn 5 and Pb 5 per cent. is small—about 0.9 per cent. This means that shrinkage during the critical second period of the freezing of a Cu/Sn/Zn alloy is reduced if lead is added, a fact analogous with the effect of the separation of graphite on the shrinkage of cast iron. In fact, the freezing process of a gunmetal can be compared to that of a hypoeutectic cast iron if primary α formation is regarded as equivalent to austenite formation and monotectic formation of α and lead melt to eutectic formation of austenite and graphite.

According to the constitutional diagram, an increase in the lead content of 85/5/5/5 leaded gunmetal above 5 per cent. should mean that the monotectic reaction starts earlier during freezing. As far as this occurs within the second stage—when feeding is usually poor—it ought to improve pressure-tightness. If the lead content be raised still higher, the monotectic reaction will start in the first stage (Fig. 2). As shrinkage in this stage is usually compensated by mass feeding, the influence of lead on the shrinkage will be of reduced importance. Thus, above a certain level, at which the separation of the molten lead-rich constituent starts and when "mass feeding" is cut off, increase of lead content will no longer improve pressure-tightness significantly.

Test Castings

The theory put forward has been verified by casting experiments at ASEA. Preliminary experiments were made under laboratory conditions in order to develop a suitable test casting; then a great number of castings was produced in the foundry. A test disc (Fig. 8), similar to the one proposed by Baker, and various other castings were poured in gunmetals, containing 5, 6·5, 8 and 10 per cent. Pb respectively, and the pressure-tightness of both discs and castings was determined.

For these experiments, the metal was melted in an induction furnace, the charge being from 300 to 700 kg (6 to 14 cwt.), and melting time about 30 min. The metal was heated to about 1,280 deg. C. and no slag was used. After deoxidation with phosphor-copper, the melt was tapped into a cylindrical ladle, preheated to between 1,100 and 1,200 deg. C.; the castings themselves being poured from preheated hand-ladles.

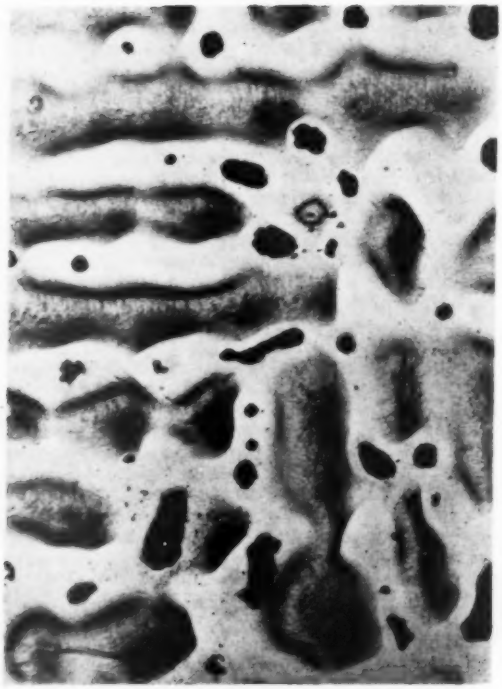

FIG. 4.—*Microstructure of leaded gunmetal, showing segregation in α phase (light to grey) and δ phase (dark grey). 500×. Etchant: ammoniacal copper chloride.*

FIG. 5.—*Same structure as Fig. 4 but etched in a different way, showing α phase (light), lead phase (dark grey) and δ phase (grey)—the latter is surrounded by α phase, high in tin. 500×. Etchant: dark ammoniacal hydrogen peroxide.*

The charge consisted of ingots of composition recorded in Table 1; to increase the lead content, pure lead was added and the zinc loss was compensated by an addition of 1.2 per cent. of that metal. Gree-sand moulds were used; these were prepared from a natural silica-base sand with the following properties: Average grain-size 0.27 mm.; moisture content 4.5 per cent; compression strength 8.5 lb. per sq. in. and permeability 63 $cm^4/g.min.$ the first series of discs, the pouring temperature varied between 1,150 and 1,050 deg. C., while for the remainder, it was kept between 1,180 and 1,100 deg. C. All castings were machined and tested for pressure-tightness with compressed air at 6 kg per sq. cm. (85 lb. per sq. in.).

Results

The analyses of the metal in the test castings

TABLE 1.—*Nominal Composition of Raw Materials Used (per cent.).*

—	Cu.	Sn.	Zn.	Pb.	Impurities.							
					Ni.	Fe.	Sb.	S.	Al.	Si.	Mg.	P.
Min. ..	83.5	4.5	4.0	4.0	0.75	0.3	0.3	0.08	0.005	0.005	0.005	0.03
Max. ..	86.5	5.5	6.0	6.0								

Two series of castings, each including 135 discs of Baker's design, were cast in alloys containing 5, 6.5 and 8 per cent. lead. Later, a similar series was made from an alloy containing 10 per cent. lead. A further 25 castings of each of six different production jobs were poured in alloys containing 5 and 6.5 per cent. lead, and test-bars for tensile testing in each case were cast simultaneously. For were normal and within specified limits (Table 2). The strength of the test-bars showed no significant variation with the lead content (Table 3), or were in castability and machinability visibly influenced by the lead.

Table 4 shows that the pressure-tightness of the discs is improved when the lead content of the alloy increases from 5 to 6.5 per cent. With 8

TABLE 2.—*Variation in Composition of Test Castings (per cent.).*

	Sn	Pb	Zn	Ni	Fe	S	Al	Si	P
Min. ..	4.7	4.5	4.3	0.16	0.02	0.05	0.001	0.002	0.03
Max. ..	5.0	9.8	6.0	0.30	0.06	0.06	0.001	0.003	0.05

TABLE 3.—*Mean Strength Values for Test Series 1 and 2.*

Test series.	Lead content.	0.2 per cent. Proof-stress	Tensile strength.	Elongation.
	Per cent.	Tons per sq. in.	Tons per sq. in.	Per cent.
1 ..	5	7.3 (11.5)	15.5 (24.5)	20
	6.5	7.2 (11.3)	15.4 (24.2)	24
	8	7.4 (11.7)	14.5 (22.8)	25
2 ..	5	7.8 (12.3)	15.6 (24.6)	22
	6.5	7.8 (12.3)	13.7 (21.7)	21
	8	7.7 (12.1)	16.1 (25.4)	25

Figures in parentheses are equivalents in Kg. per sq. mm.

and 10 per cent. lead, no further improvement is obtained. The low values of series 1 are probably due to low pouring temperature.

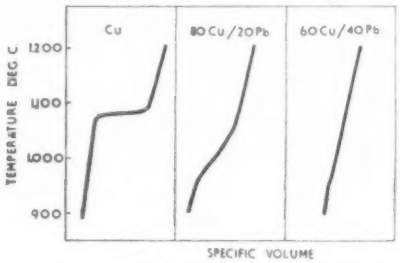

FIG. 6.—*Volume change which attends the melting of copper and copper/lead alloys.*

TABLE 4.—*Pressure-tightness of Disc Castings at Various Lead Contents.*

Lead content.	Series 1. Number of castings.	Series 1. "Tight" castings.	Series 2. Number of castings.	Series 2. "Tight" castings.
Per cent.		Per cent.		Per cent.
5	42	7	46	42
6.5	45	66	45	86
8	45	25	45	78
10	—	—	45	(89)

Leakage occurred partly through the centre and partly through the disc near the centre (A and B, Fig. 8). Leakage at A but not at B was influenced by the lead content. Both types, but particularly type A, increased with decreasing pouring temperature. An examination of sectioned discs showed that leakage through the centre (A) was caused by cavities and porosities, while leakage at B was due to hot-tears. The number of castings containing cavities decreased when the lead content increased. There was no distinct correlation, however, between leakage and shrinkage cavities in the

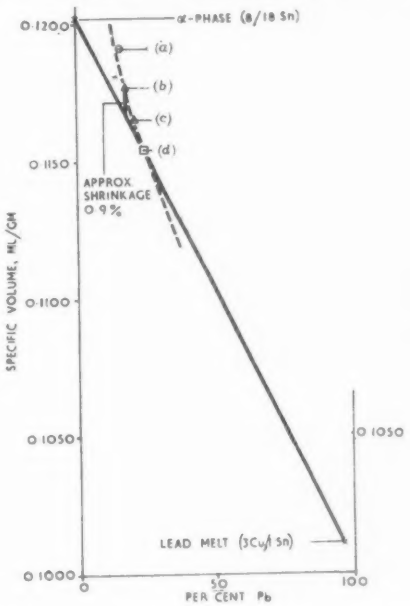

FIG. 7.—*Specific volume at 943 deg. C. of monotectic melt α phase, and molten lead-rich constituent with compositions as obtained at the solidification of different Cu/Sn/Pb alloys. A simplified method of determining the shrinkage which attends the monotectic reaction is indicated.*

Key: (*a*) alloy 7 Sn/5 Pb (monotectic melt 14 Sn/16 Pb); (*b*) alloy 5 Sn/5 Pb (monotectic melt 11 Sn/18 Pb); (*c*) alloy 5 Sn/7 Pb (monotectic melt 10 Sn/21 Pb); and (*d*) alloy 3 Sn/7 Pb (monotectic melt 7.5 Sn/24 Pb).

centre. Improved pressure-tightness was also obtained for all production castings tested, when the lead content was raised to 6.5 per cent. (Table 5).

COMMENT

The mechanism suggested for the influence of lead on the freezing shrinkage during the last stage of solidification has been verified by the author's and Malmberg's determinations of the volume change of the monotectic melt at the transformation to α crystals and lead-rich constituent. Whether

TABLE 5.—*Pressure-tightness of Production Castings with 5 and 6.5 per cent. Lead.*

Lead content, per cent.	Number of each casting.	Tube collar 1.	Tube collar 2.	Lid 1.	Lid 2.	Valve housing 1.	Valve housing 2.
		Pressure-tight castings, per cent.					
5	25	49	48	20	100	32	100
6.5	25	96	96	76	100	84	100

Pressure-tightness of Leaded Gunmetal

lead, however, promotes pressure-tightness in any other way than by reducing the solidification shrinkage during the later stages of the solidification has not been studied. The reduction of shrinkage cavities obtained during the casting experiments using increased lead content indicates, however, that mass-feeding is facilitated as a result of lead addition.

Malmberg[9] has determined microscopically the amount of porosity in wedges cast in a gunmetal with different lead contents. He found that at a pouring temperature of 1,180 deg. C., 6.5 per cent., and 8 per cent. Pb decreased the amount of porosity equally, as compared with a 5 per cent. Pb alloy. At a pouring temperature of 1,110 deg. C., the amount of porosity decreased, when lead was increased from 5 to 6.5 per cent. and still more with 8 per cent. Pb.

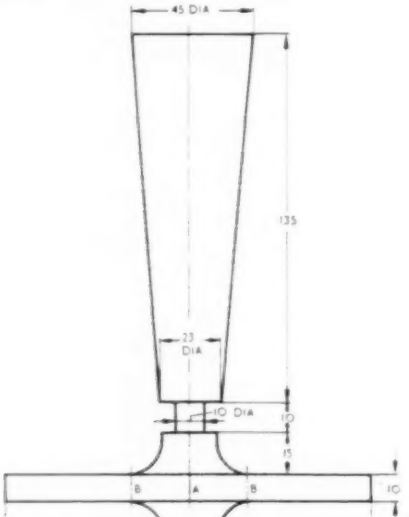

FIG. 8.—*Test disc used for the casting experiments.*

Although the practical experiments have confirmed the theory advanced by the author, some reservations should be made. Solidification is influenced by many factors, such as impurities in the metal, melting and casting techniques, moulding sand and shape of castings. For example, if a column structure arises the need of lead to reduce shrinkage will be less pronounced. Furthermore, leakage can be caused by factors other than porosity, such as, hot-tears, dross inclusions and blowholes. Different results may thus be obtained if the conditions are changed in any of these respects.

It is of interest to examine how the possibility of obtaining pressure-tightness for Cu/Sn/Pb alloys varies with lead content in the presence of different tin contents, according to the theory put forward. From the equilibrium diagram of Cu/Sn/Pb and Fig. 7 can be calculated approximately, both the amount of solid (α_2-crystals) present when the monotectic transformation starts, and the shrinkage of the monotectic melt (Table 6).

The practical experiments have confirmed that in relation to pressure-tightness, the optimum lead content is 6.5 per cent. at 5 per cent. tin. According to Table 6, this lead content corresponds to 68 per cent. of the metal having solidified when the monotectic transformation starts. For other tin contents, this value corresponds to the following percentage combinations of tin and lead: 0/11.5; 3/8, and 7/5. According to the author's theory, lead contents higher than these cannot, under normal feeding conditions, be expected to improve pressure-tightness. However, no attention has been paid to the influence of tin and zinc on the course of solidification.

TABLE 6.—*Correlation between Tin and Lead Contents and Solidification Conditions in the System Cu/Sn/Pb.*

Tin.	Lead.	Amount solidified when monotectic transformation starts.	Shrinkage of monotectic melt.
Per cent.	Per cent.	Per cent.	Per cent.
0	3	92	0.0[1]
	7	81	0.0[1]
	11	67	0.0[1]
3	3	85	—
	5	78	—
	7	72	—
	9	66	0.0[2]
5	3	83	—
	5	73	0.9[1]
	7	67	0.6[2]
	9	61	—
7	3	80	—
	5	70	1.1[2]
	7	61	—
	9	53	—

[1] Measured and [2] calculated values.

From Table 6, it is also apparent that the shrinkage of the monotectic melt increases with the tin content. Therefore, an alloy low in tin and high in lead ought to be most suitable for producing pressure-tight castings. This is in agreement with the results obtained by Kura and Eastwood[6] referred to earlier.

Acknowledgment

The author is grateful to the cast-copper alloys committee of *Sveriges Mekanförbund* for interesting discussions; to Mr. T. Sundell, foundry manager at the Ludvika works of ASEA, and to Mr. A. Berg and Mr. R. Lindgren who carried out a large proportion of the experiments. In addition, the author is indebted to ASEA for their kind permission to publish this paper.

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Polish Foundry Abstract

A recent issue of the Polish foundry journal, *Przeglad Odlewnictwa*, reaching FOUNDRY TRADE JOURNAL office contains an article on "Slags in the Cupola Process" an abstract from which is given below:—

Detailed investigations were carried out in the field of the desulphurization action of slags in an acid and basic cupola according to the chemical composition and temperature of cast iron with 0.7 to 0.9 per cent. Si content. The influence of slag basicity and of temperature on the carburization rate in an acid and basic cupola was also investigated. It was shown that for the progress of the metallurgical processes of desulphurization and carburization in the cupola, the temperature and basicity of the slag and the viscosity of the latter is the deciding factor. The relationship between the desulphurization index and the slag basicity, the MgO, FeO, Al_2O_3 concentration is given in the form of graphs with plotted curves. It was shown that at temperature above 1,380 deg. C. and with a slag basicity 2.6 ($CaO:SiC_2$) a good desulphurization, *i.e.*, the obtaining of a desulphurization index above 30 ($^{S}_{slag}:^{S}_{molten\ iron}$) is ensured. An important influence of CaF_2 on the desulphurizing action of acid slag, *i.e.*, with a basicity below 0.9, was shown as well as the negative influence of increasing MgO concentration in the slag on the desulphurization, both in acid and basic slags. The investigation proved a very strong negative influence of the slag FeO content on the desulphurization, the concentration of FeO decreasing with the increase in basicity and temperature. The positive influence of the Al_2O_3 concentration on the acid slag action up to 12 to 13 per cent. was shown; the optimum concentration for basic slags is approximately 8 per cent. Al_2O_3.

The important influence of the slag basicity on the carburization grade was stated. A basicity above 3.0 ensures the carburization of cast iron with 0.7 to 0.9 per cent. Si content above 4 per cent. C already at 1,380 deg. C., whereas with an acid slag at the same temperature 3.0 to 3.1 per cent. C is hardly obtained. The data are elaborated which make possible a visual estimation of the slag quality by examination of the cast sample.

AS PART OF THE EXPORT DRIVE, the Minister of State, Board of Trade, the Rt. Hon. Frederick Erroll, M.P., on September 20 toured factories in the Leicester area. In the evening he addressed a meeting of industrial executives, export managers, etc., on the subject of the export campaign. On the next day, as previously announced, Mr. Erroll opened the Factory Equipment Exhibition at Belle Vue, Manchester.

New Catalogues

Protective Clothing and Apparatus. Siebe, Gorman and Company, Limited, Neptune Works, Davis Road, Chessington, Surrey, have issued nine leaflets, which, bound together, would make an interesting catalogue. Amongst these, is DUS/1 which illustrates the V.H.E. respirator, a model approved under the Iron and Steel Foundries Regulations—1950. Several of the leaflets deal with gas respirators, and one of these, RES/2, is quite impressive as it illustrates 14 different types of multicoloured containers designed to give protection against a whole range of noxious gases, the colours being associated with one or a group of gases. Five of the leaflets are devoted to wide ranges of protective clothing designed to suit various industrial conditions.

Rope Drives. Crofts (Engineers), Limited, Thornbury, Bradford, 3, have issued an eight-page catalogue covering the potentialities of their "Ultivee" rope-drives. The "rope" is made of firm, man-made fibre, and it is stated that improved mechanical properties have been provided as a result of constant research, development and testing. The catalogue lists five advantages of the "Ultivee" drive over orthodox V-rope drives and useful technical data are incorporated, together with clear diagrams.

Dust Collectors. In publication No. 52, Keith Blackman, Limited, Mill Mead Road, London, N.17, cover seven sizes of the new Tornado-Cyclogal high-efficiency cyclone dust-collectors. The range covers normal rated duties from 160 to 42,500 cu. ft. of dust-laden air per minute. The efficiency, it is claimed, is such that it will deal with dust in sizes down to five microns. It is reported that the unit is being used on hot-blast cupolas and in connection with foundry grinding operations.

Cutting-off Machine. In list MWC1, B. O. Morris, Limited, Morriflex works, Briton Road, Coventry, illustrate a machine designed to cut structural steels such as angles, channels, joists, etc. It would seem that the machine could possibly be adapted for cutting off runners and risers attached to castings.

Materials Handling Plant. Within the compass of a four-page leaflet (No. 200), Holdan Engineers (in association with W. C. Holmes and Company, Limited), 119, Victoria Street, London, S.W.1, have described and illustrated examples of the mechanical plant they produce for handling water, power-station ash, dust and various other materials.

Thomas Marshall widens Management Scope

Changes in management are announced by Thomas Marshall & Company (Loxley), Limited, fireclay refractory manufacturers, of Sheffield. To provide the managing director, Mr. Arthur Marshall, with some relief from the increasing responsibilities which the continual growth of the company creates two assistant managing directors have been appointed. Mr. W. T. Hale becomes assistant managing director on sales and commercial matters and Mr. T. A. Marshall becomes assistant managing director generally responsible for production and works' control.

Mr. Hale joined Carblox, Limited, a subsidiary of the Marshall group, in 1948, was appointed sales manager of the parent company three years later and sales director in 1954. Mr. Marshall has been with the company 10 years and for some time was works manager at Marshalls' Storrs Bridge Works.

Staveley Iron & Chemical Sold for £6,000,000

Britain's second largest State-owned steel company —the Staveley Iron & Chemical Company, Limited, Staveley Works, near Chesterfield—has been sold by the Iron and Steel Holding and Realization Agency to Stewarts and Lloyds, Limited, steel tube, iron pipes and castings, and steel makers, of Glasgow. The entire issued share capital of Staveley Iron has been purchased by Stewarts and Lloyds for £6,000,000, which, it is understood, will be financed from the group's own resources and by arrangement with its bankers.

Staveley Iron was formed by the Staveley Coal & Iron Company, Limited (now a holding company), as a wholly-owned subsidiary in 1948 and Staveley Iron passed into public ownership in 1951. After arbitration proceedings in 1952 the parent company was awarded £8,200,000 compensation.

In 1955 Staveley Iron bought from ISHRA the whole of the issued share capital of the Sheepbridge Company, Limited, Chesterfield, iron and steel makers, for £2,175,387 (the compensation value). Three iron-ore companies, Byfield Ironstone Company, Limited, Cranford Ironstone Company, Limited, and Loddington Ironstone Company, Limited, which passed into public ownership in 1951, have since become subsidiaries or associates of Staveley Iron.

Substantial Recovery Expected

Over the last three years the profits of Staveley Iron have fallen from £1,800,000 in 1957 to £1,200,000 in 1958, and to £652,969 in 1959, but a substantial recovery is expected in the current year's results. It is second in importance to Richard Thomas & Baldwins, Limited, among the companies still State-owned.

Earlier this year the Minister of Power, Mr. Richard Wood, asked about the disposal of RTB, replied that this might be best carried out when its present large-scale development plans were further advanced and there were more tangible signs of the company's earning capacity. The Government had to decide whether to give priority to selling RTB or to completing the divesting of the "prior charges" of companies already denationalized.

The announcement of the disposal of Staveley Iron brought an immediate protest from Mr. Frederick Lee (Lab.), Opposition spokesman on the steel industry. "The Government's credit squeeze policy of dear money has made this the worst time to sell the steel undertakings," he said. "The Government knows quite well that it is dissipating public assets for no other reason than its determination to sell at any price. It is quite barmy."

Stewarts and Lloyds last week sent a letter to all Staveley Iron employees indicating that it would honour all of the Derbyshire concern's obligations, including its pension commitments. Two directors of Stewarts and Lloyds, Mr. L. M. T. Castle, managing director, finance and general administration, and Mr. N. C. MacDiarmid, managing director of Stanton Ironworks Company, Limited, have been appointed to the seven-man board of Staveley Iron.

Commenting on the take-over price of £6,000,000, a spokesman for the works committee of the Amalgamated Engineering Union, whose members are employed by Staveley Iron, said: "We feel that this has been given away. The company was only marking time with its orders, but it was worth at least what the Government paid for it—and that was over £8,000,000."

New First-aid Requirements for Factories

People in charge of first-aid boxes in factories employing more than 50 workers will in future have to be registered nurses, enrolled assistant nurses, or people holding a first-aid certificate issued within the three previous years by a training organization. This requirement is laid down by the Minister of Labour in an Order amending the Factories Act, 1937.

Training organizations designated in the Order are the St. John Ambulance Association, the St. Andrew's Ambulance Association, and the British Red Cross Society. Factories with their own training organizations may be approved by the Chief Inspector of Factories where standards are comparable to those provided by the designated organizations.

To allow firms time to bring their first-aid workers up to the required standard, the regulations will not come into force until July 1, 1961, and until the end of December, 1962, a person shall be deemed to be properly trained if at any time during the last 10 years he has held a first-aid certificate issued by a training organization.

Details of the names and qualifications of the people in charge and of the date on which evidence of their training was last inspected by the occupiers of the premises will have to be entered into or attached to the general register maintained by the factory under the Factories Acts.

Higher Dividend and Capital increase by Newton Chambers

The directors of Newton, Chambers & Company, Limited, ironfounders, engineers, chemical manufacturers, etc., of Thorncliffe, near Sheffield, propose to increase the authorized capital from £3,000,000 to £3,500,000, to subdivide the £1 ordinary shares into units of 5s. each, and to offer to ordinary holders rights on a one-for-eight basis. Details will be announced shortly.

The company is raising its interim dividend by 2 per cent. to 8 per cent. in respect of 1960 and, from results to date, it is expected, subject to no unforeseen circumstances arising, that the board will recommend a dividend at a total rate of 20 per cent. for 1960. The 1959 total was 17½ per cent.

The additional capital is required to repay short-term borrowings. In recent years the group has greatly extended its activities and increased its fixed assets and working capital, mainly out of its own resources.

Newcast acquired by Chas. Churchill

Charles Churchill & Company, Limited, South Yardley, Birmingham, has acquired control of Newcast Foundries, Limited, Newcastle-under-Lyme. Newcast have been suppliers of high-quality castings to the group for several years, but the growing production demands of the machine-tool firm have made it desirable for it to acquire its own foundry. Already plans are prepared for a major expansion scheme which it is intended will double production within the next twelve months. The sales policy of Newcast will remain unchanged and the management is to continue with Mr. C. Reynolds as commercial director and Mr. R. Lewis as technical director.

Chevrolet's New Aluminium Foundry

Adaptation of a British Die-casting Process for American Automobile-component Production

As a natural complement to the account of "Low-pressure Die-casting" (published in the JOURNAL, August 11), the following gives the story of the process adapted to the American production of automobile parts (by arrangement with the British firm of Alumasc, Limited, who developed the low-pressure method). In the successful Chevrolet applications, it is interesting to have substantiation of the claims made by the originators and to learn of the application of various process controls inseparable from very large-scale production. Improvements in detail are also claimed, in relation, of course, to usage of metal and other materials available at the American site.

Many of the automobile parts cast at Chevrolet Motor Division's new aluminium foundry at Massena, New York, (Fig. 1) are made by the low-pressure moulding process which is revolutionary to the American automobile industry. In America, the process is regarded as an intermediate one between pressure-die-casting and permanent-mould (gravity-die) casting. Pressure is certainly used to force molten metal into the mould cavity, but considerably less pressure is applied than normally used in pressure-die-casting. Low-pressure casting has long been carried out in British foundries, but the process at Chevrolet-Massena has already been developed to utilize many local modifications to suit the differing types of production.

Basic Details

The low-pressure process uses air pressures up to 10 lb. per sq. in. to push the molten aluminium into the mould cavity in a relatively smooth and slow manner, without turbulence. The mould cavity (usually a metal die-assembly) is mounted above a holding furnace and receives metal directly from a tube, or stalk, immersed vertically in the molten aluminium. This is accomplished by providing the metal reservoir with an air-tight lid and introducing pressurized air or gas above the surface of the metal, the pressure being regulated to force the metal up the stalk into the mould cavity. The slow entry of metal creates a natural temperature-gradient in the die and promotes directional solidification back to the source of the molten metal. The pressure applied to the metal also assists in the feeding of molten metal until liquid shrinkage is complete and the casting has solidified. After solidification, the air pressure is released, the die is opened and the casting lifted and ejected.

Advantages

The advantages of low-pressure die-casting which led Chevrolet to adopt the process for several components are:

(1) *High Density.*—Castings produced are of high density and can be produced virtually free from porosity and shrinkage.

(2) *High Yield.*—Large ingates and feeders and risers are eliminated, thus saving costs of removing and remelting them. Often, parts cast by conventional pressure-die-casting processes require gates, heads and risers totalling as much as half their finished weight to insure adequate solidity of the product.

(3) *High Productivity.*—Automatic casting and hydraulically actuated moulds permit one man to operate more than one machine.

(4) *Low Equipment Costs.*—Initial costs of plant are lower for low-pressure die-casting than for pressure-die-casting and about equal to equipment for gravity-die-casting.

(5) *Clean Castings.*—Due to the use of a sealed furnace and upward "pouring" of metal, castings made by the low-pressure method are relatively free of oxides.

Application

Automobile parts cast by low-pressure at Massena include cylinder-heads and crankcase halves, a rear-engine housing, oil filter and generator adapter and camshaft gear for the Chevrolet 'Corvair' model and for the 'Corvette' clutch-housing. When equipment for Chevrolet-Massena was being decided upon, several of Chevrolet's manufacturing executives toured the European plants utilizing the low-pressure casting method, including the originators, Alumusac, Limited, of Burton Latimer, England. Following this, the equipment now being used by Chevrolet was designed specifically for that plant by the General Motors' process development section at the GM Technical Centre near Detroit. Illustrations of plant and processes at Massena foundry are shown in Figs. 2 to 4.

Modifications

The high-production requirements for the Chevrolet-Massena plant made it desirable to incorporate a higher degree of automation of operating methods as compared with those being used in Europe. For instance, a typical British unit employs one highly skilled operator per machine, there is but a minimum of controls, clamping and actuation of the mould components sometimes being effected manually, while in most cases the operator does his own die re-coating when required.

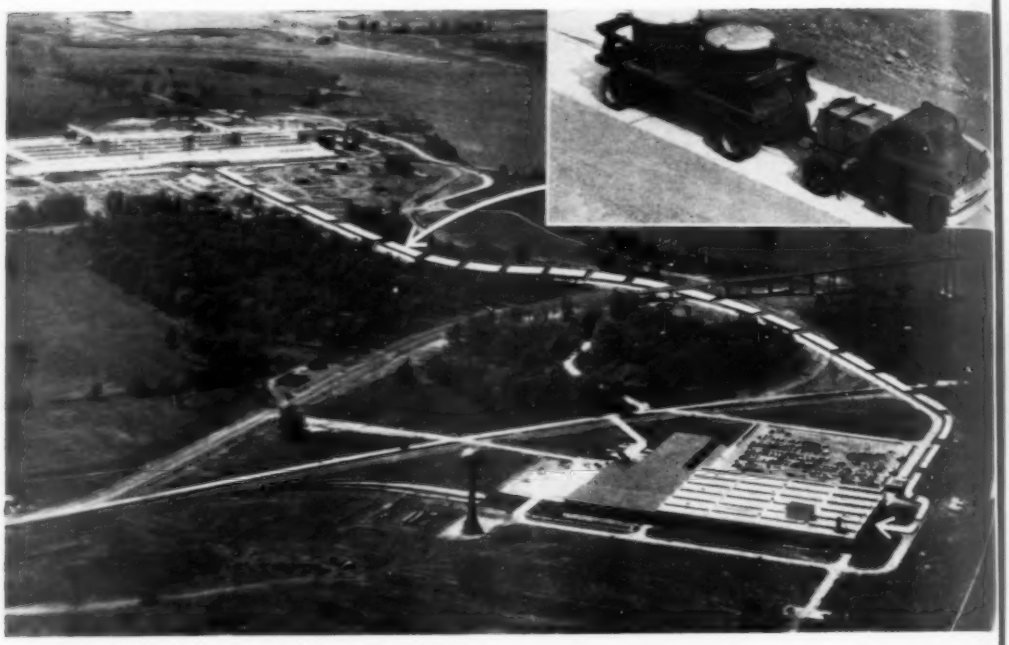

FIG. 1.—*Aerial view of Chevrolet Motor Division's new aluminium foundry (lower right) at Massena, New York. It shows the private road over which molten aluminium is delivered from Reynolds Metals Company's nearby aluminium-reduction plant (upper left). A specially-equipped Chevrolet tractor and trailer (inset, upper right) hauls two 4-ton-capacity ladles of the molten metal over the three-quarter-mile route.*

Normally each machine in the UK is set up with its own die, there being only limited interchangeability of dies. This is partly because the lower wage-rates which are operative in Europe make productive labour costs relatively of less importance than in the States. Thus, to achieve maximum machine and die utilization, Chevrolet and GM engineers elected to set up a three-shift plant operation schedule, with complete interchangeability of parts, a procedure which resulted in minimum "down time" for mould maintenance and repair. To reduce the need for operator skill, the engineers designed Massena's equipment for automatic mould actuation and timing. To reduce hazards to operators they also incorporated further air and electric safety controls on the equiment.

Critical Points

The design of the basic casting unit for automobile cylinder-heads (Fig. 2) is a Chevrolet development, though the casting machine is pneumatically and electrically controlled, with the moulding equipment—as before—located immediately above the holding furnace.* Also, as in the original UK plant, upon application of pressure to the surface of the metal, it is forced up the delivery tube, into the moulds. A number of the snags normally encountered in handling molten aluminium are present when low-pressure casting and are further multiplied by the fact that the molten metal is pressure sealed in the crucible and is accessible for compositional adjustments only during periods of shut-down which are costly. The use of a coated iron "stalk" or delivery tube at first appeared in America to be a formidable handicap to the process because any break in the coating would rapidly contaminate the melt with iron and ultimately also make it necessary to replace the stalk.

Another, and almost equally critical point of control was the stalk-orifice heater. If, for any reason, metal in the final opening leading into the die should freeze, it had to be melted with a torch, while heat in the moulds and cores was being lost. In most instances, however, it was found that the small solidified piece of aluminium could be knocked down conveniently into the molten metal below, where it rapidly remelted.

The importance of increasing durability of die-coatings and cooling-fin-blade coating materials in the Chevrolet application cannot be over-empha-

* As previously reported, more than 30 holding furnaces of the low-frequency induction type have been supplied by one British firm for use in American foundries operating the low-pressure process.—Editor.

sized, and the company is continually experimenting with new materials and methods of application in order to obtain an increased number of castings from each coating. At one time, coating durability appeared to be the most critical problem, but is gradually being brought under control, it is stated.

Control of furnace temperature on most of the low-pressure equipment is accomplished by inserting an adequately protected thermocouple into the metal, but in a few applications the actual metal temperature was originally not definitely known. The control element here is the cast-iron liner of the holding furnace which is heated by low-frequency induction currents. Inside this liner is another liner of a clay/graphite type in which the metal is held. Initial experience with this equipment was good, but more recently a direct metal-temperature control, using a thermocouple tube in the metal itself, has been incorporated, largely because section-thickness changes in the clay/graphite liners made indirect temperature control difficult of achievement.

The American alloy to specification No. 356 was selected for all low-pressure casting at Chevrolet because of its good heat-treatment characteristics. All castings produced are artificially aged for four hours at 205 deg. C. (400 deg. F.), except the camshaft drive-gear, which is solution-heat-treated for eight hours at 525 deg. C. (980 deg. F.), followed by a hot-water quench, before being aged.

Laboratory

The laboratory of Chevrolet Motor Division's new aluminium foundry includes a well-equipped chemical section, a physical-testing section, radiographic and metallographic equipment, a complete sand-test unit and a temperature-control section. The die-layout room comprises the normal complement of precision measuring devices and has a 30-in. comparator which uses a shadow technique for inspecting contours on components which are difficult to appreciate by the unaided eye. All new moulds and dies are rigidly inspected in the plant's layout room. By the application of such controls, volume can be controlled in such parts as the cylinder-head combustion-chamber to within 0.5 ml. as cast. (Fig. 3 shows a trimming process on the cylinder-head line.)

FIG. 2.—*Low-pressure die-casting machine for air-cooled cylinder-heads at the Massena plant.*

Routine

The use of Chevrolet-Massena's test facilities begins with incoming molten metal. As soon as a truck of hot-metal (Fig. 1) reaches the foundry, a sample is taken from each of the two ladles, the laboratory receiving the samples through a pneumatic-tube system. Within ten minutes, composition results are evaluated and a disposition made. Only then is the metal poured into the foundry's large holding furnaces. In the meantime, the metal is fluxed with chlorine to remove any gases present. In the holding furnaces, magnesium, titanium/boron and manganese additions are made to bring the molten aluminium to specification. Following this, metal in each holding furnace and casting furnace is sampled further and checked on a Quantometer at regular intervals to maintain exact alloy control.

Other checks at Chevrolet-Massena to control materials include those made to insure adequate quality in sand cores. The sand laboratory staff first carries out checks on the fineness and distribution of foundry sand. Resins are checked for solids content, material composition and coating control; sand cores are checked for tensile strength, hardness, permeability and gas evolution and the works chemical laboratory personnel check lubricants, mould-coating materials, hydraulic fluids, resins, tool-steel and cleaning solutions.

Chevrolet's New Aluminium Foundry

Casting Quality Control

Finished castings are subjected to numerous checks. Visual inspections are made to guard against excess flash, misruns, broken core-pins, and the general appearance of the castings is also taken into account. Inspection-department personnel make further visual inspections on a routine sampling basis. Periodic samples also are sent to the layout room for dimensional checks.

Schedule samples of the foundry's production of castings are also checked by the laboratory. Such checks include a tensile- and yield-strength test in the as-cast condition. Still further castings are subjected to micro-examination to analyse the structure of the various alloys used, both as-cast and after various heat-treatments.

Any castings requiring pore-free structures also are subjected to periodic radiographic examination to check against shrinkage, cracks and porosity. Such tests are made with X-ray equipment or on a fluoroscope and are applied to locate any possible defects at an early stage, so that die adjustments can be made promptly. In most instances, sufficient warning of the start of casting defects can be determined to permit correction of temperature or coatings to maintain casting quality within established control limits. Hardness tests also are made on a numerical sampling basis.

Building Ventilation

The heat and dust produced in foundry operations have long caused ventilation problems for industrial firms operating such plants. Special attention was paid in the design stage to these problems at Chevrolet's new foundry. As part of this, a network of tunnels was laid out under the factory floor to serve as air-ducts for supplying warm or cool air, as needed, to all manufacturing areas. In the season when artificial heating is needed, up to 375,000 cu. ft. of heated air per min. can be circulated throughout the plant through these tunnels. The heat is provided by 15 oil-fired unit-heaters with a combined capacity of 30,000,000 BTU's per hour. This system is augmented by an additional 9,200,000 BTU's per hour from ceiling-suspended heaters strategically located across the plant. The combined capacity of these two systems permits a complete change of air every three minutes throughout the plant.

During summer months, the same tunnels carry cool air, circulated by the same blowers, but supplemented with an additional 125,000 cu. ft. of air per minute. This results in a change of air every one and a half minutes throughout the plant.

Experience to Date

After about one year's experience of working in the Chevrolet foundry, shrinkage porosity troubles at the low-pressure plant, which plagued early operations, had been minimized by die-design changes and other improvements in practice. The

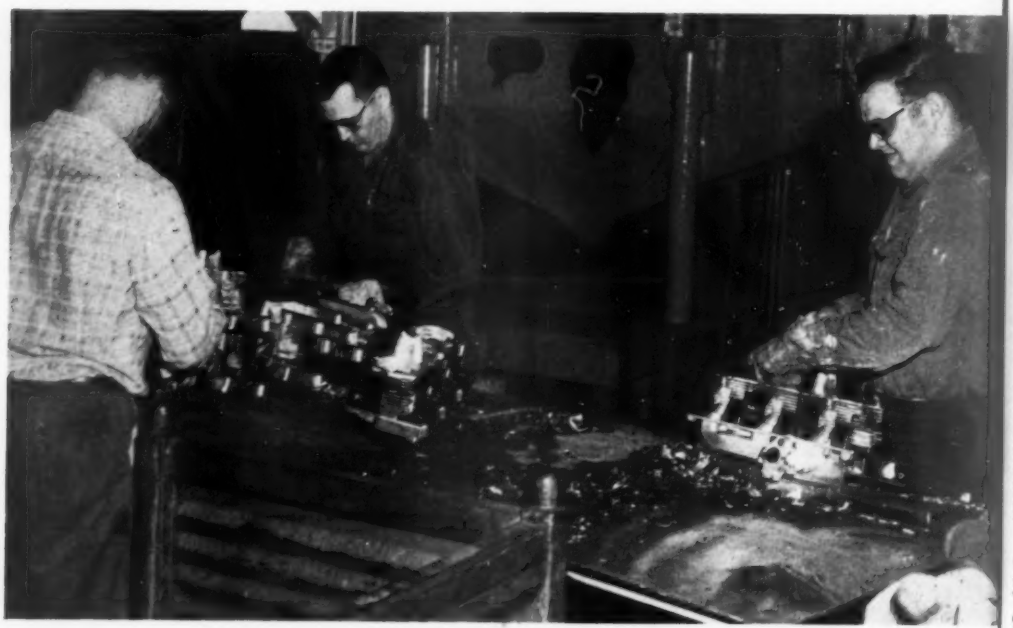

FIG. 3.—*Trimming castings on the cylinder-head line; note the thin-section of the cooling fins.*

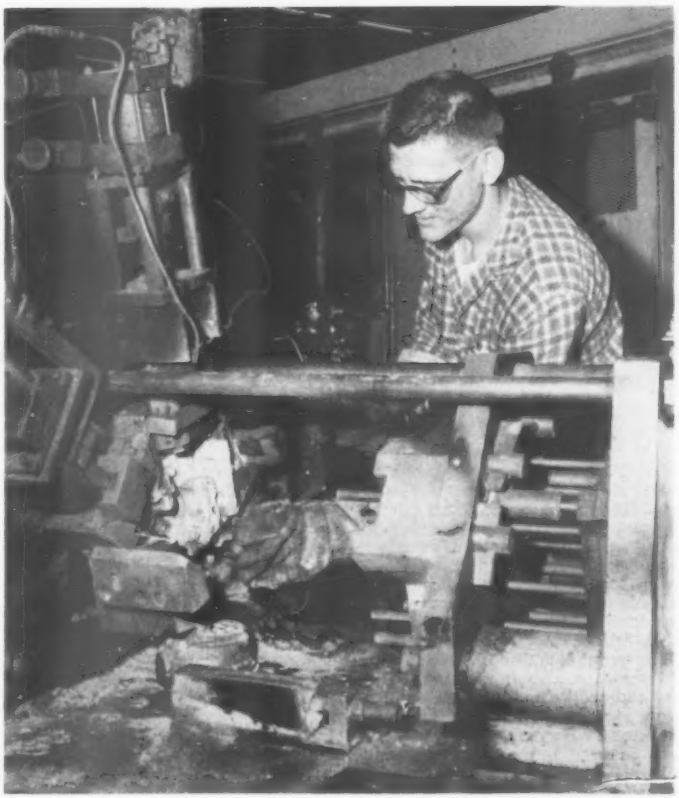

FIG. 4.—*Touching-up a die after casting by spraying on a coating material at a critical location. This particular die is parted vertically and includes a number of drawbacks and core-rods, each of them mechanically actuated.*

mould-coating problem, which appeared at one time to be the most formidable obstacle to steady production, although still not eliminated, has now been substantially reduced (Fig. 4). On the cylinder-head, for example, typical coating life has been raised from about 30 castings per coating to about 75. This has been accomplished by good mixing and by better understanding and control of the ingredients of the coating itself.

Stalk "life" has been improved enough so that it is no longer a primary problem, and contamination of metal in the casting-machine furnaces with iron dissolved from the stalk has been virtually eliminated. Two parallel lines of plant and process improvement in this sphere have been the development of a "shellrock" stalk and a general improvement in the control of coating practice used on the iron stalks themselves.

Machine-tool Industry Research Plan

New research association is being formed to serve the British machine-tool industry. Sponsored by the Machine Tool Trades Association, it will administer funds contributed by the industry for research projects in machine-tool design and production. About 100 manufacturers of machine tools and in allied industries have undertaken to finance the association for a minimum of five years, and it is also intended to apply for aid to the Industrial Grants Committee of the Department of Scientific and Industrial Research.

An announcement last week by the Machine Tool Trades Association says that the new association will not involve the construction of new laboratories to act as a centre of development and design, which has sometimes been canvassed for the industry, but will simply co-ordinate and expand the work of machine tools which is being carried on at existing establishments, such as the Manchester College of Science and Technology.

By this means, it is stated, quicker results from a wider range of research projects will become available to the industry than would be the case if the Machine Tool Industry Research Association waited for the erection of its own laboratories. A director of research "of the highest possible qualifications" will be appointed in the near future, and the association will let out work by contract to existing research establishments.

Loss by United Gas in Reorganization Year

Group net loss of £167,672, after exceptional losses of £243,428 (nil), is reported by United Gas Industries, Limited, for the year to March 31, 1960. This figure is against a net profit of £54,095 for the previous year. The ordinary dividend is 2½ per cent. against a total of 6 per cent. The trading profit was £246,602 against £279,146. The exceptional losses were almost entirely in respect of losses arising on tools, stocks, and fixed assets which became obsolete or redundant following changes in production policies, or as a consequence of reorganization of certain subsidiary companies.

All the major companies are trading this year at least as successfully as in 1959-60, and the chairman, Mr. H. H. Bates, looks forward to a group trading profit roughly similar to that for 1959-60. Reorganization of the company's activities should be almost completed by the end of the year, providing a firm base of control for the future.

The directors are working towards the creation of three basic divisions: meters; engineering and appliance; and furnace and construction. The meters division is still the mainstay of the business and retains its position in a highly competitive market, the chairman adds.

F

Polish Foundry Competition

The general councils of the Metal Trade Union and of the technical Association of Polish Foundrymen have announced an open* competition for a paper on improvement of working-place organization in a foundry.

The purpose of the competition is to awake initiative in raising the efficiency in foundry work by improving the organization of work places in respect of: productivity, yield, reduction of scrap, raising product quality, lowering physical effort and production costs, in addition to popularizing these improvements in the foundry world. The subject chosen may be the efficiency of a whole foundry or one department.

A comparison of the entries for the competition will permit material rewards to be made to authors of the best ideas and also the authors of the best descriptions. Merit awards will also be made for the next-best papers.

Conditions

Conditions of entry for the competition include:— (1) Improved efficiency claims may concern any part of a foundry. (2) Those eligible to take part are members of the technical association of Polish Foundrymen and anyone employed in the foundry industry, inventors and executives either as individuals or in association, and proposers of schemes recommended in writing but awaiting putting into practice. (3) Authors of papers (descriptions) should be the executives who carried out the improvements or persons submitting papers in the executive's name. (4) The paper should be written clearly and be complete, illustrated by drawings, graphs and possibly photographs and certified by the respective works management as to the character and achievements of the author. (5) In the description, the conditions existing before the efficiency improvement should be given, together with steps taken and changes during the process and also the conditions obtained after completion of the improvement and its adoption for at least three months in practice. (6) Participants in the competition may submit any number of papers. (7) Competition papers should be sent to the General Council of the T.A.P.F. Krakow, Straszewskiego 28, in a sealed envelope and marked by a pen-name. In another sealed envelope marked in the same way should be put names and addresses of the authors submitting the particular paper. (8) The closing date for submitting papers is February 28, 1961. (9) The competition results will be established by a panel composed of five people selected by the General Council of the constituent organizations of the T.A.P.F. (10) The best papers will be awarded prizes as follows: One first prize of 5,000 zl. (about £430 and a diploma, two second prizes of 3,000 zl. each (and diplomas), and two third prizes of 2,000 zl. each (and diplomas). (11) The next four papers in order will be distinguished by honorary diplomas of the General Council. (12) The competition committee may at their discretion withhold the first or any of the following prizes and distinctions. (13) The committee will publish the competition results during the two months following the closing date. (14) The respective constituent organizations will publish the competition results no more than two weeks after they are established by the committee and will notify the authors of papers in writing in addition to publishing them in *Przeglad Odlewnictwa* and *Metalowiec*. The authors of papers may express the wish (by so stipulating in the envelope containing their name) that their name is not to be published in case of their not being awarded a prize or a distinction. (15) The organisers reserve the right to publish in print the prize-winning papers, which will then be paid for according to current rates. (16) The right is reserved of exhibiting the papers which have suitable format.

* The announcement does not make it clear whether or not foreign participation is invited, but interested readers could satisfy themselves on this point by writing to the Polish organizers.—*Editor.*

New Patent

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.)

830,042 John Arthur Frank Kinsman, Poste Restante, Montmedy, Meuse, France.

Improvements in or relating to centrifugal machines, for projecting abrasive and/or granular material for scouring, decarbonizing, shot-peening and similar purposes. The main objective of the invention is to provide an improved form of machine wherein the abrasive and/or granular material may be projected from the machine in a desired direction in the general plane of the blades of the machine, no matter in what position the machine is mounted around its axis. The combination of a support-plate and injector each rotatable through 360 deg. permits the mounting of the machine in any position around its axis without the need for altering the location of the supply reservoir for the abrasive and/or granular material, whilst also there may be no sharp bend in the injector into which the feed line from the reservoir leads such as might limit the quantity of abrasive and/or granular material that could be introduced into the machine without causing a " bottleneck " in the injector. Additionally, the same form of support-plate and injector may be employed irrespective of whether the machine is to be mounted so as to be capable of rotating in a clockwise or anti-clockwise sense, thus avoiding duplication of spare-part stocks.

Ladle Practice

The well-known Belgian foundryman, Mr. Ivan Lamoureux, writing in the September issue of *La Fonderie Belge*, suggests that for ironfoundry ladles of from 40 lb. to 4 tons capacity, the cleaned bottom plate should carry a network of strands of straw. A diagram shows three concentric rings associated with a squared network. Above 4 tons capacity the author recommends that for the bottom refractory, slab bricks should be used as they give a longer life. Another tip given is to use, when filling a large ladle, a hand shank to break the fall of the liquid stream until about a 2-in. layer covers the bottom.

It is a little surprising to read that a hint is given for the removal of pigs cast from over-metal into sand. Surely modern practice demands the use of chills, as the scrap so produced is clean and requires less fuel for remelting.

In *BSI News* for September it is announced that an amendment slip to British Standard CP 339: Domestic butane gas-burning installations. Part II installations in caravans and small non-permanent buildings (amendment No. 4) has now been issued. It is obtainable from the sales department of the Institution at 2, Park Street, London, W.1, the order reference number being PD 3863.

Cost of Industrial Accidents

*By V. A. Broadhurst, B.A.**

Following hard on the 1959 Report of the Chief Inspector of Factories, which though mentioning lower severity of accidents stressed their increased number, it is germane to examine the real expense occasioned in the event of an accident in a foundry. Whilst the cost of an accident in terms of human suffering is obvious, its real financial cost is largely concealed. It is true to say that the genuine accident is avoidable and so, therefore, is its cost. This article points out to foundry executives what sort of items total cost can include, and makes a useful background against which to set assessment of the proceedings of the recent CFA Safety Conference†.

It has been pointed out frequently that there are both direct costs and indirect costs of every accident and that the latter, hidden though they may be, often exceed the former by three times, *i.e.*, the indirect costs are four times the direct ones. In fact an employer has to foot a much larger bill than is realized for each accident. The dictum applies sometimes with more force in foundries than in other industries.

Direct Costs

The first and obvious cost of an individual accident in a foundry is the money paid to insure the firm against Common Law claims for injury, as well as the employers' contribution towards the Industrial Injury Fund. It is unusual these days for a firm to carry its own insurance against accidents, although the Government—as an employer of personnel—does so. This direct cost is fixed with reference to the risks of the industry in general and of the particular foundry; a bad accident-record puts up premiums, and *vice versa*.

However, many firms also pay the whole or part of the wages of an employee who is off work after an accident. Practices vary, but senior personnel, in particular, often have their pay made up. Also, if there is local keen competition for labour it may be the custom to do this for less-senior people. In more out-of-the-way places, it is not unusual for a firm to help with transport of the injured man to hospital, a least immediately after an accident has happened. Here, there is a labour and vehicle cost to be counted in the total.

Among the special services provided in connection with accidents at a factory are first aid, and the administration of appropriate wages- and benefit-schemes. All these cost money. Another unwelcome cost which sometimes arises and which cannot be insured against is the fine imposed by a Court of Summary Jurisdiction to which the firm may be taken by a Factory Inspector. Incidentally, these fines may well be greater in the future, as the new Factories Act of 1959 has increased the maximum fines threefold.

Indirect Costs

Interference with production and the disruption of the work of many persons in addition to an injured man lead to more expenditure of money as a result of an accident. Senior personnel may have to devote some of their highly paid time to matters arising out of the event. The very absence of the injured man leads to loss. The abrupt and unexpected withdrawal of his services, with its consequent upset to production, may have quite serious effects financially.

Costs of accidents vary considerably also from purely forfuitous factors. If a key-man is injured, the effect is likely to be more serious than if the victim were a labourer. Plant may be affected also and this adds to the real cost. Accidents in power-stations have been known to black-out a whole area, just as an accident in a transformer house can shut a whole foundry which relies on electric steel. Accidents on some machines, however, lead merely to the spoiling of the work in that machine at the time. Yet again, an accident in trimming a large mould may waste the efforts of a team of moulders spread over several weeks.

If the injured man be employed on a continuous process, for instance, his accident may damage a batch in its entirety. It is impossible to foresee the total cost of an accident, as this will vary between wide limits according to particular circumstances. It is well recognized that fellow workmen will normally leave their work when a man has an accident. They go to help him or to summon first aid or tell the management. For some time afterwards, too, they stand around and discuss it, particularly so in the case of a fatal accident. Thus is production further interrupted, along with additions to the cost of the occurrence.

Heightened emotions are usually noted after serious accidents in foundries, as in other works, and this is likely to lead to lowered production and an increase in the amount of spoiled work. Quantity and quality of the articles produced in the foundry suffer also. Such an increase in the amount of waste leads to more wasted labour as the scrap has to be handled for removal and disposal, or for reclamation. Here there are both material and labour costs, as articles are disposed of as scrap by men who should be engaged on productive work.

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* The Author was formerly H.M. Inspector of Factories.

† "Ironfounding Health and Safety Conference" organized by the Council of Ironfoundry Associations, April 6 to 8.

Cost of Industrial Accidents

Consequential Damage

Consequential damage to buildings, plant, machinery, tools and other property should not be overlooked when totting-up accident costs. An accident with a fork-lift truck for example may do a lot of damage to the vehicle, the goods it is transporting, the building into which it may crash—as well as to the driver and possibly also to "third parties."

Another fairly common case of this kind concerns foundry cranes and other lifting machines. If, as has happened on many occasions, a valuable load falls from a crane which is hoisting it, a very costly accident may result, particularly if personnel are also injured. Damage is often done to plant in accidents—for example, when a crane overturns or parts of the structure collapse. The cost of the material damage may be considerable, especially if the product smashed was an expensive one.

There may even be liability to third parties in any accident. One case arose in an agricultural engineering works when the tyre of a tractor burst and injured both the workman dealing with the job and a commercial representative standing by.

The need to obtain details of the accident at the time and before the plant is disturbed calls for the attention of some responsible person and his time is usually valuable. In the case of a fatal accident, the area may have to be sealed off pending the arrival of the Coroner's officer. The Factory Inspector also may want to see the exact circumstances before they are disturbed. This means further interference with production as well as requiring the personal attention of management officials.

For some time after the occurrence, a foundry foreman and others may have to spend time dealing with the matter. Reports have to be made out and discussions held in order to find ways of preventing a recurrence; perhaps a new method of working will be devised, requiring the services of the Work Study staff as well as the general management—though the expense of this should rightly be set against future savings resulting from safer working. Where fatal and serious accidents have happened, time may be needed for attendance of managerial personnel at the Coroner's Court and the Magistrate's Court.

Even with accidents of less-serious consequences, the foundry foreman will probably have to redeploy men to cover the work done by the injured party; in some cases the foremen in fact do the injured man's work, particularly if no one else can be spared or because no one else knows the job well enough. Failure to keep delivery dates is, in the increasingly competitive conditions of today's foundry industry, a simple way of losing orders in the future. Efforts have therefore to be made to keep up despatches even if this means working overtime temporarily—another expense.

Accidents Without Personal Injury

Some expenses may be incurred even when personnel are not themselves injured. It cannot be stressed often enough that the same circumstances may either lead to personal injury or none at all. In many cases the injurious consequences are fortuitous; thus, for instance, a fork-lift truck may crash into a building but neither the driver nor passers-by may be injured. Yet, at the same time any people who happen to be positioned slightly differently might be killed.

It has been calculated that there are three-hundred times as many incidents without personal injury as there are with injury to persons. It follows, however, that many accidents not leading to personal injury—and therefore not officially classed as accidents—may in fact lead to substantial financial loss by the foundry.

Further Incidental Expenses

It should also not be overlooked that even when an injured man returns to work another cost has to be recorded, because he is likely to be slower at his old job at first, since his accident will most likely have lowered his efficiency. Perhaps he may not even be able to do his old job and then more money will have to be spent on training him for a new one.

A bad accident record for any foundry is not a good advertisement and may make recruitment of the right kind of labour more difficult. Such a record is not conducive to good industrial relations and co-operation with a Trade Union (which might be led into believing that the management is not doing its best to improve matters) may be difficult. After all, the record of accidents can be measured statistically and if the number increases no one can be satisfied that all is well.

Fortunately for all concerned all the possible consequences of an accident which have been recorded in this article do not follow from each individual accident; but they are all potential costs and may add up to a formidable total. It follows as a truism that the total cost of an accident is far more than superficially it appears to be.

PRACTICAL course in human relations called "Direction and supervision of scientific and engineering personnel," will be held at Northampton College of Advanced Technology, London, from October 12. It will consist of 16 full days at fortnightly intervals, during which senior administrators and technologists will study an imaginary organization represented by specially written case studies.

A POOLS WIN almost stopped production at the Sprotborough (Doncaster) works of John Fowler & Company (Leeds), Limited, makers of diesel crawler tractors, diesel locomotives, etc., last week. Nine men engaged on important export orders learned that their syndicate had won £11,311. They took 10 minutes off to congratulate one another and then went back to work.

Equipment and Supplies

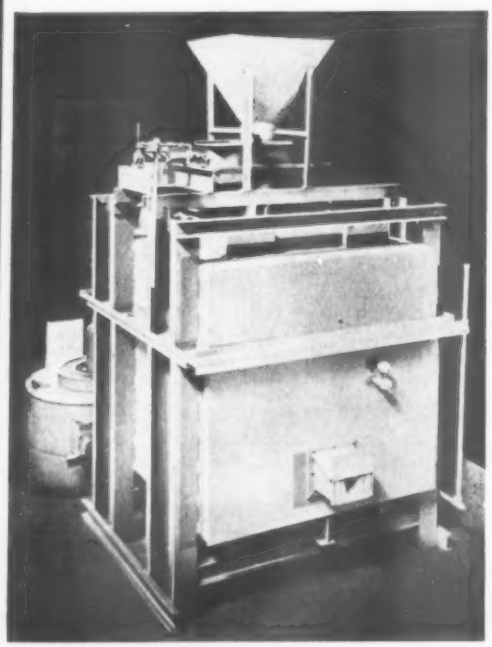
Furnace for Aluminium Melting and Holding

A dry-hearth furnace for aluminium melting, with a companion holding-furnace (Fig. 1), both of American design, are now being made in this country by the Electric Resistance Furnace Company, Limited (Netherby, Queens Road, Weybridge, Surrey). The two furnaces form a central installation for melting up to 500 lb. of aluminium per hour for die-casting and sand casting, and for recovering aluminium from scrap. The metal can be ladled direct from the holding furnace or tapped off and delivered hot to other holding furnaces as required.

Aluminium scrap is charged into the furnace hopper where preheating begins; as it moves into the furnace it collects on and above a sloping, dry hearth of silicon carbide and is contained in a vertical cylindrical muffle heated externally by silicon-carbide electrical elements. The molten metal is directed by the hearth through a covered trough where it runs out—without overheating—to be maintained in the holding furnace at the precise temperature required. To prevent oxidation, the metal is melted and held at temperature in an atmosphere of high-purity, dry nitrogen. Oxide present in the scrap collects on the hearth and can be raked out through an outlet, normally closed with a plug, at the rear. This hole can be used for inserting ingots.

It is claimed that the furnaces are ruggedly constructed and heavily heat-insulated and that elements can be easily and quickly replaced. Installations are supplied complete with temperature control-gear and the furnaces can be arranged for operation on standard single- or three-phase electrical supplies. The melting furnace is rated at 100 kw., the holding furnace has a capacity of 13 cwt. and a rating of 20 kw.

FIG. 1.—*Dry-hearth melting furnace for aluminium which incorporates a holding unit of capacity 13 cwt.*



Portable Conveyor

A new portable belt conveyor now being produced by Numec, Limited, New Whittington, Chesterfield, is known as the "Cadet." Its overall length is 22 ft. It can be operated at any angle up to 45 deg. and will load up to a height of 17 ft. with one end on the ground. The central height can be varied from 3 ft. 3 in. to 8 ft. 6 in.

The conveyor has a pair of large-diameter wheels fitted with pneumatic tyres so that it can be moved easily by one man. There is a towing bracket at the hopper end and both the bracket and hopper are detachable. The hopper is generally used for loading loose materials and its capacity can be increased by the addition of detachable extension pieces. Either a petrol or electric motor can be supplied for external drive or else an electric motorized drum can be fitted.

The belt has 2-in. corrugated sides and tough cross bars, enabling it to handle any granular material including sand, coal, and coke. Sacks and bales, or cases even larger than belt width can also be transported. Depending upon the type of material and the operating angle, a capacity of up to 75 tons per hr. is claimed. Both the raised sides and the cross bars permit a greater working angle than with normal belting.

The belt is made for Numec, Limited, by the Dunlop Rubber Company, Limited, in standard widths from 9 in. to 36 in. and with corrugated sides 2-in. and 3-in. high. These raised sides form tough walls on the straight without tension at the ends, it is stated, while the height of the sides is said to increase the bulk carrying capacity by up to 50 per cent. over conventional belting of equal width.

Non-destructive Testing of Steel

For non-destructive testing of steel in thicknesses of up to 4 in., the majority of existing high-voltage X-ray units and radioactive isotopes are suitable. Above that thickness, however, exposure times become too long. At the same time, as thicker castings in steel are frequently encountered, the need arises for a powerful X-ray generator possessing a good degree of sensitivity.

The Siemens 15-MeV mobile betatron (Fig. 2), recently introduced by Pantak, Limited, Vale Road, Windsor (Berks), comprises essentially an electromagnet shaped in the form of a shell-type transformer which contains an air gap in its middle leg. The function of this a.c. excited transformer is to create a magnetic flux in which electrons are accelerated almost to the speed of light in a doughnut shaped accelerator tube surrounding the electromagnet. The flux produced varies rapidly in shape from the injection stage, when electrons are injected from a cathode filament, through four following stages of deflection and transfer into the magnetic field, a packing phase, a distribution phase, a phase when the flux is constricted, this leading finally to the emission of electrons which strike a platinum target and thus give rise to extremely high energy X-rays. During this process, the electrons travel approximately 1,000 miles.

The substantial savings in exposure time which can be made with this new tool are shown, for example, by the fact that exposures for steel thickness of between

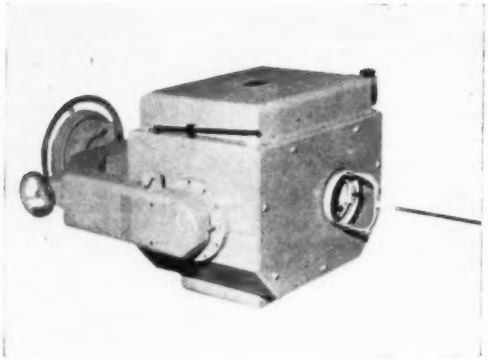


FIG. 2.—*Siemens 15-MeV Mobile Betatron.*

6 and 8 in. need only a few minutes, while that for a 16-in. thickness of steel is between one and two hours, as compared with an exposure of several days which would be required even with a high-voltage X-ray tube of the conventional type. Apart from this saving, a new technique of radiographing a casting while still hot is possible. A further point of note is the fact that a magnification technique, giving an image of up to three times the size of the flaw, can be used with this equipment

Blast-heater for Export

Photographed as it leaves for Vienna is this cupola hot-blast heater designed and made by Incandescent Heat Company Limited, Smethwick. It will supply 3,000 std. cu. ft. of air per min. at 500 deg. C., for a pair of 6-ton-per-hour cupolas in an Austrian foundry, producing radiators for central-heating systems. Fired by natural gas, the heater is reported to be completely automatic in starting up and in operation, its programme controller being set in operation by a single push-button. (The JOURNAL of September 16, 1954, contained details of this type of plant under "Equipment & Supplies.")

Lighting Control

Changes to the automatic lighting control-unit, series ALC.3 made by Lancashire Dynamo Electronic Products, Rugeley, Staffs, are designed to give improved performance at lower cost. The unit will switch any form of lighting on or off according to the daylight level, and in one winter it is claimed that it can recover its cost by preventing the unnecessary use of artificial lighting during daylight hours. The unit has now been fitted with a moulded-glass window and a Neoprene seal for the weather-proof case; it embodies a narrow vertical sensitivity-pattern to prevent interference from artificial lights and a spectral sensitivity distribution chosen to ensure true north-light operation, it is stated.

Light-alloy Reference Slide

International Alloys, Limited, Haydon Hill, Aylesbury, Bucks, has published a very useful cardboard sliding computor, which at a glance will give the chemical composition and the mechanical and foundry properties of 15 aluminium alloys against set requirements. It is amazing how much technical information can be assembled and detailed so quickly by the slide method.

Arc-welding Electrode: A new arc-welding electrode, known as "Opal 3½ Ni," has been developed by Cooper & Turner, Limited, of Vulcan Works, Vulcan Road, Sheffield, 9, for the welding of low carbon 3½ per cent. nickel and similar steels where good Charpy Impact values are required at sub-zero temperatures.

Iron-ore Imports

Imports of iron ore and concentrates (except chrome iron ore) and roasted iron pyrites in July, and the totals for the first seven months of this year and last, are shown in the table below.

From	Month ended July 31.	Seven months ended July 31.	
	1960.	1959.	1960.
	Tons.	Tons.	Tons.
Sierra Leone	57,530	387,746	474,131
Canada	505,266	985,229	1,397,124
Other Commonwealth countries and Eire	3,000	9,600	19,607
Sweden	404,945	1,703,943	2,729,526
Norway	35,470	155,998	206,251
France	37,872	270,590	337,917
Portugal	15,770	126,234	209,604
Spain	46,378	298,261	454,955
Algeria	145,658	848,217	1,210,794
French West Africa	—	133,341	—
Tunisia	40,705	308,403	481,104
Morocco (excluding Tangier)	60,375	230,328	498,495
Liberia	73,740	213,573	323,554
Venezuela	140,734	680,448	969,323
Brazil	53,010	315,128	396,054
Other foreign countries	39,849	99,698	401,894
Total	1,660,302	6,766,737	10,110,333

A NEW BRANCH OFFICE at 2, Queen Square, Bath, (Somerset) was opened on September 19 by United Dominions Trust, Limited.

Translation Service

From amongst the most recently published lists of translations available from the Iron & Steel Institute (4, Grosvenor Gardens, London, S.W.1), the following have been selected as being of interest to founders. The price quoted is that for single copies, postage extra, there being reductions for quantities ordered. Readers writing for translations, or for further information, should mention this JOURNAL when doing so.

BISI 1592 BEHAVIOUR OF SULPHUR IN BLAST-FURNACE SMELTING AND WAYS OF REDUCING THE SULPHUR-CONTENT OF PIG-IRON. Voskoboinikov, V. G. *Stal'*, 1955, July, pp. 583-591. (£6 5s.) Original and available information on the distribution of sulphur between metal, slag and gas in the blast-furnace is considered, and experiments on the de-sulphurization of pig-iron outside the furnace are described. Although the elimination of more than 50 per cent. of the total sulphur through the furnace top can be achieved by suitable choice of operating conditions, the resulting decrease in efficiency would be prohibitive in ordinary, but might be acceptable in low-shaft, blast-furnace practice. By means of data presented the calculation of true sulphur content of the iron and other problems can be solved. Examples showing good agreement between calculated and actual values are presented. It is suggested that the influence of temperature on the de-sulphurizing power of slags, although substantial, has previously been exaggerated. By the use of soda ash (0.8-1.0 per cent. of weight of metal) about 50 per cent. of the sulphur can be removed from normal foundry iron at the blast-furnace plant, but it is recommended that the desulphurization is better effected in the foundry. Several substitutes for soda ash in external desulphurization are discussed and results of tests and plant drawings are presented. Latest evidence suggests that magnesium is a good external desulphurizing agent. (Abstract *JISI*, 1956, September, p. 85.)

BISI 1780 OXIDE INCLUSIONS IN IRON/CHROMIUM/OXYGEN MELTS (with discussion). Koch, W., et al. *Arch. Eisenhüt*, 1960, May, pp. 279-286. (£4 15s.) Experimental melts for producing the samples. Isolation of the oxide inclusions. Experiments to separate the oxides from the isolate. Structure of the oxide inclusions and their changes on heat-treatment. Forms of the oxide inclusions. Summarized consideration of the observed structural changes. (Author's summary.)

Translations in course of preparation include:—

BISI 1854 TEN YEARS' LARGE-SCALE VACUUM-DEGASSING OF STEEL. Küntscher, W. *Neue Hütte*, 1960, July, pp. 383-398.

BISI 1862 ELECTRO-SLAG HEATING OF FEEDER-HEADS OF INGOTS AND SHAPED CASTINGS WITH THE AID OF AN INFUSIBLE ELECTRODE. Tyagun-Belous, G. S., & D. A. Dudko. *Avtom. Svarka*, 1958, Oct., pp. 36-43.

Brutcher Translations

The following translations are among those recently made by Mr. H. Brutcher to whom enquiries should be addressed at Technical Translations, P.O. Box 157, Altadena, Calif., U.S.A.

HB 4893 EXPERIMENTS ON MODELS—AN AID IN STUDIES OF THE DEGASSING OF LIQUID METALS. Kraus, Th., & O. Winkler. *Berg- & Hütt., Monatsh.*, 1960, (6), pp. 135-140.

HB 4894 VACUUM-PUMP SETS FOR INDUSTRIAL PLANT, PARTICULARLY THE STEEL INDUSTRY. Noll, H. *Ibid.*, pp. 140-142.

HB 4895 PRACTICAL EXPERIENCE IN VACUUM TREATMENT OF OPEN-HEARTH STEELS. Därmann, H. J. *Ibid.*, pp. 144-151.

HB 4896 FUNDAMENTALS OF CLOSED-CIRCUIT STEEL-DEGASSING PROCESS. Maas, H. *Ibid.*, pp. 151-157.

HB 4897 SOME OBSERVATIONS ON STEELS REMELTED IN VACUUM-ARC FURNACES. Ogiermann, G. *Ibid.*, pp. 157-161.

HB 4898 CRYSTALLIZATION OF CASTINGS UNDER THE ACTION OF ULTRASOUND ON THE LIQUID METAL. Balandin, G. F. *Izvest. VUZ-Mashinostroenie*, 1960, (4), pp. 24-34.

Lists of HB translations, arranged by subject, may be obtained from Mr. Brutcher at the above address, an alphabetical list of lists is also obtainable.

Other Translations

For the following translations application should be made to the organization indicated by the letters BCIRA etc. at addresses given at end of list.

BCIRA 958 GRAIN SIZE OF GREY CAST IRON. Abcouwer, J. S. International Foundry Congress, Proc., Liege and Brussels, Sept. 28-Oct. 4, 1958, Paper No. 13, pp. 241-247.

OTS 60-21475 SURVEY OF U.S.S.R. LITERATURE ON AIR POLLUTION AND RELATED OCCUPATIONAL DISEASES, VOL 3. Anon. Order from *O.T.S.* $4.00.

BCIRA 962 GASES IN STEEL AND IRON ALLOYS. Feichtinger, H., J. Gremminger, H. Bachtold, and D. Manderson. *Berg- und Hüttenmännische Monatshefte*, 1957, *102*, Oct., pp. 257-271.

BCIRA 960 WET RECLAMATION OF OLD CO$_2$ SANDS. Gerstmann, O. *Freiberger Forschungshefte* (Bergakademie Freiberg) 1958, Berlin, E31, pp. 241-258.

BCIRA 963 SCIENTIFIC PROBLEMS OF MOULDING MATERIALS AND TECHNIQUES. Grochalski, R. *Giesserei*, 1959, *46*, Jan. 29, pp. 60-63.

BCIRA 965 FLASH-BUTT WELDING OF GREY CAST IRON. Hütter, L. and H. Neumann. *Giesserei*, 1959, *46*, No. 27, pp. 1001-7.

BCIRA 964 LABORATORY INVESTIGATIONS INTO SHELL MOULDING MATERIALS AND THEIR RELATIONSHIPS TO TECHNICAL EXPERIENCE. Lottermoser, M. *Giesserei*, 1959, *46*, Dec. 17, pp. 988-89.

BCIRA 961 WET STRENGTH AS A NEW CONCEPT FOR DEFINING THE BEHAVIOUR OF CLAY-BONDED MOULDING SAND, AND THE INFLUENCE OF ACTIVATION ON WET STRENGTH. Patterson, W., and D. Boenisch. *Giesserei*, 1958, *45*, Sept. 11, pp. 565-567.

OTS 60-11155 CARBIDES, SILICIDES, BORIDES, NITRIDES AND SULPHIDES OF RARE METALS AND THEIR APPLICATION IN A NEW TECHNOLOGY. Samsonov, G. V. Akad. Nauk URSR, Kiev, Visnyk, 1959, v. 30, No. 6, pp. 27-37.

SLA 60 10279 NEW KNOWLEDGE CONCERNING CARBON DIOXIDE PROCESS. Schumacher, W. *Giesserei* (W. Germany) 1955, v. 42, No. 24, pp. 653-59. (German Foundry Technical Assoc., rept. No. 11). mi $2.70, ph. $4.80.

Symbols for sources of translations:

BCIRA: British Cast Iron Research Association, Bordesley Hall, Alvechurch, Birmingham. OTS: Office of Technical Services, Department of Commerce, Washington 25, D.C., U.S.A. SLA: SLA Translation Center, John Crerar Library, 86, East Randolph Street, Chicago 1, Illinois, U.S.A.

BISITS Annual Report

It is interesting to note that in the annual report of the British Iron and Steel Industry Translation Service, it is stated that during 1959, 386 translations were produced, this being about the same number as in the previous year. Over half of these were from German, 60 from Russian, 16 from Japanese, two from Chinese, and the remainder from 11 other languages. Information about translations is now distributed to over 300 organizations in the form of fortnightly and six-weekly lists, besides being published in the journals of various technical associations.

John Brown acquires Bone Bros.

All the shares of Bone Bros., Limited, makers of paper-making and converting machinery and plastic extrusion machines, of Wembley (Middx), have been acquired by John Brown & Company, Limited, shipbuilders, marine engineers, etc., of Glasgow. The business of Bone Bros. will be complementary to a portion of Brown's wholly-owned subsidiary, Cravens, Limited, Sheffield, in whose engineering division a range of plastic injection moulding machines is manufactured together with die-casting machines and metal-working presses.

Mr. Noel Browne will continue as managing director of Bone and the following will be elected to the board: Mr. E. Mensforth, Mr. J. E. Owston, Mr. G. K. Johnston, Mr. D. Grant and Mr. H. C. Cook.

THE USSR will give the United Arab Republic technical assistance in designing and constructing a shipbuilding yard in Alexandria, under a contract signed in Moscow between the Soviet Prommash-export organization, and the general organization for the fulfilment of the five-year plan of industrial development of the Egyptian region of the UAR. The shipyard will build ships up to about 550 ft. long, and carry out repair work. Prommashexport will deliver the main equipment for the shipyard.

News in Brief

INCREASED PRODUCTION from the new factory of CIBA (A.R.L.), Limited, has led to the announcement of substantial reductions in the prices of their epoxy-resin surface coatings, with effect from August 1.

THE WEST AUSTRALIAN GOVERNMENT will retain its Koolyanobbing iron-ore deposits until they can be used for a fully integrated steel industry. Premier Brand is reported to have stated on his recent return to Perth from Canberra.

WICKMAN, LIMITED, Coventry, have issued a technical bulletin, STB/2, covering Wimet new grade XL35 of tool-tip material based on tungsten carbide, for which is claimed improved toughness and resistance to wear and thermal shock.

PLANS HAVE BEEN APPROVED for a steel-rolling mill at Grange Lane, Barnsley, for C. G. Carlisle & Company, Limited. Barnsley Council has been seeking new industries for the town, and it is expected that the new mill will absorb a number of the men who now travel to steel mills in the Sheffield area.

THE INDIAN GOVERNMENT has decided to set up a committee to consider the feasibility of manufacturing low-cost cars within the price range of £487 10s., and to report to the Government within four months. It is also reported that the (Indian) Government has decided that the proposed economy cars will be manufactured in the public sector.

NEW APPRENTICE TRAINING SCHOOL, opened on September 8 at the Stanningley (near Leeds), Works of George Cohen, Sons & Company, Limited, a member of the George Cohen 600 Group, will increase the works' capacity for apprentice training from 25 to 50 apprentices at any one time.

THE SOUTH LEEDS EVENING INSTITUTE (Leeds Education Committee) acknowledges donations to the Prize Fund from Crosthwaite Furnaces & Scriven Machine Tools, Limited, Yorkshire Imperial Metals, Limited, Hunslet Engine Company, Limited, Jackson Boilers, Limited, Yorkshire Patent Steam Wagon Company, Limited, and other firms.

NORFOLK METALS, LIMITED, manufacturers of non-ferrous alloys, Effingham Road, Sheffield, announce that the company has recently succeeded in obtaining Ministry of Aviation approval for its products. This recognition is remarkable, since non-ferrous products are not usually associated with Sheffield, except for the spoon and fork section of the catering industry.

SOUTH AFRICA'S NEWEST WARSHIP, anti-submarine frigate *President Kruger*, will be launched in Glasgow on October 20 and is expected to be completed for handing over early in 1962. The ship is being built by Yarrow & Company of Scotstoun, Glasgow, under the £21,000,000 expansion programme of the South African Navy announced under the 1955 Simonstown Agreement.

A SEVEN-AND-A-HALF-TON FUME EXTRACTOR for use on the electric melting department furnace of Jessop-Saville, Limited, at Sheffield, was lifted into place by two 60-ft. cranes on September 15. The hopper, 12-ft. high, was hoisted 40 ft. into the air, and dropped on to a 30-ft. high steel platform. It had been made in sections at Manchester, and assembled by John Young (Sheffield), Limited, steel erectors, at Darnall.

AVELING-BARFORD, LIMITED, engineers, Grantham, Lincolnshire, are building new premises at Newcastle to be used for research, development and manufacture of their machines. It is expected that the company will move into the new premises early next year, when the number of employees will be increased from the present 100 to 300 or more. A new roadmaking machine will be amongst the Newcastle products.

DAVID BROWN TRACTOR DIVISION at Meltham, near Huddersfield, is to produce more tractors for India. A licence issued in 1959 to make 1,250 14 h.p. tractors per annum has been trebled, and now includes the 35 h.p. and 42 h.p. models. A new factory is to be built near Bombay, where a company has been formed between David Brown and the Indian distributors. Technicians from Meltham are on their way to India.

The FIRST INTERNATIONAL CONGRESS ON METALLIC CORROSION is to be held in London from April 10 to 15, 1961. In collaboration with the organizers of the Congress, the Science Museum is arranging a Corrosion Exhibition mainly of historical interest. Social events arranged for the evenings include a Government reception, other receptions and a banquet. An attractive programme is also being arranged for the ladies.

DELTA METAL COMPANY, LIMITED, and Yorkshire Imperial Metals, Limited, announce arrangements whereby the alloy-tube manufacturing business hitherto carried on by Booth & Mapplebeck, Limited—a member of the Delta group—will be acquired by Yorkshire Imperial Metals Limited, and Delta will take an interest in the latter company. The production of copper-tube by the Delta group through its subsidiary, Earle, Bourne & Company, Limited, is unaffected by this arrangement.

CELEBRATING THEIR TRADITIONAL HOLIDAY on August 7, Bulgaria's railwaymen reported the construction of more than 625 miles of new track in the past 15 years. Almost all the new rolling stock—50-ton wagons, 50-ton tankers, 35-ton tippers, 58-ton gondolas, 16-ton refrigerators and 88-seat passenger coaches—are being built at Bulgarian plants. In the next decade more than 1,200 miles of track will be electrified. Last month, the doubling of the track Sofia-Mezdra was completed.

EXPORT ORDERS for Wild-Barfield Electric Furnaces, Limited, Watford, Herts, include 50 furnaces for India, varying from the small muffle-type to those for full-scale production. An order from Belgium is for a crystal-pulling furnace; a large high-temperature furnace has been ordered by the Royal New Zealand Air Force, and laboratory and toolroom equipment is being manufactured for Canada. Five special kilns and a large glass-annealing lehr are being made by the Applied Heat Company, Limited, a Wild-Barfield subsidiary.

A 500,000-KW. SINGLE-SHAFT STEAM TURBINE has been designed at the Kirov Works, Kharkov. The unit weighs 830 tons and has been designed for 3,000 r.p.m. at an initial steam pressure of 240 atm. and a temperature of 580 deg. C. It is claimed to be technically superior and more economical even than the 300,000-kw. single-shaft turbine now being built at the same works. It is reported that each kw. of the capacity of the designed turbine will be 20 per cent. cheaper and it will need almost one-third less floor-space in the powerhouse per kw. capacity.

MR. W. FISHER, chairman of the New Zealand Steel Investigating Company, has stated that the proving of iron sands deposits likely to be of significance to an iron and steel industry would start immediately. The extent, quantity and quality of iron sands for such an industry was not known, and more information was essential. Drilling would begin with

deposits on the North Island's west coast; laboratory testing of samples would take place at the same time. Mr. Fisher also stated that the company had acquired premises in Wellington and would occupy them next month.

SOUTHERN RHODESIA'S MINERAL PRODUCTION in July totalled over £2,250,000 for the first time, according to the Southern Rhodesian Minister of Mines, Mr. C. J. Hatty, on August 31. Total output for the first six months of this year was just over £15,000,000, nearly a 6 per cent. rise over the corresponding period last year. Mr. Hatty stated that copper, tin and chrome were the main contributions to these results. Copper output would increase in a month or two when the Alaska Maine, near Sinoa, started production. Values would also increase greatly when the mine's smelter started operating next month.

THE EUROPEAN FEDERATION OF PURCHASING, which consists of professional organizations of buyers in industrial and public undertakings in many countries, has published the proceedings of its second European Purchasing Conference held in Holland in April, under the title "Purchasing in Europe." It is a 108-page publication printed in three languages, English, French and German, which contains nine papers given at the Conference in their original language, with summarries in other languages. Copies may be obtained from the European Federation of Purchasing, Wardrobe Court, 146a, Queen Victoria Street, London, E.C.4.

THE PAKISTAN GOVERNMENT has finalized a scheme to raise chromite production from 18,000 tons to 50,000 tons per year by 1964. The entire quantity of chromite produced in the country is exported. To boost production of this mineral the Government has issued licences for the import of heavy machinery and equipment. Meanwhile, Raz Koh and Kharian mine areas, where high grade of chromite has been found in commercial quantity, are likely to be developed shortly. A scheme for concentrating poor quality chromite ore is also being pursued. The feasibility of establishing a ferro-chrome plant is also currently under consideration.

THE REGIE NATIONALE DES USINES RENAULT and Italy's Finmeccanica, have signed an agreement to co-ordinate production of tractors for sale to Common Market countries. Renault will make small power wheel tractors (less than 45 h.p.), while the Italian industry will build more powerful types. A special provision in the agreement concerns the expansion of a range of heavy tractor production to be carried on in Italy. The French company will take care of the commercial side of the business and will sell the items produced by both companies in the French market and elsewhere except Italy, where a newly-established corporation, the Azienda Commissionaria Macchine Agricole will handle the products of both industries.

AT A MEETING of the Greater Birmingham Employment Committee in Birmingham on September 15, Mr. A. C. Cox, secretary of the committee, said that unemployment in the area had hardened slightly between July and August and the hardening was likely to be reflected in the September figures. Mr. George Evans, area organizer of the National Union of Vehicle Builders, said that there was evidence short time was increasing in the motor industry. He expressed the view that proposals to take work away from Midland centres of the car trade to redevelopment areas would make the position of the industry in the Midlands more tenuous. It was stated, however, that the Midland percentage of unemployed was still below the national average on the latest count made in August.

THOS. FIRTH and JOHN BROWN, LIMITED, have made a deal of £70,000 with Spear & Jackson, Limited, involving the acquisition of 7,000 sq. yd. of land which formed part of the original Aetna Works, Sheffield, of Spear & Jackson, together with some buildings. There is also an exchange of land and boundary adjustments between the firms on the south side of Savile Street where Spear & Jackson are developing and modernizing. The land and buildings secured by Thos. Firth and John Brown are on the north side of Savile Street. They include the head offices of Spear & Jackson but the firm is not moving until new extensions to rehouse the saw-making departments and headquarters offices are completed. When Spear & Jackson first moved to Savile Street over a century ago, the land is said to have cost 1½d. per sq. yd. The cost in the present deal, with buildings, to Thos. Firth and John Brown, is £10 per sq. yd. The deal is part of the Spear & Jackson's re-organization. The company's fork-making work was transferred from the premises involved to C. T. Skelton & Company, Limited, of Heeley, a subsidiary, in the works holidays.

Obituary

Mr. W. E. PARKER, a founder and a director of the Tipton firm of British Rolling Mills, Limited, Brymill Steelworks, has died at the age of 80.

Mr. WILLIAM NICHOLSON, Eastern counties sales representative of Allied Ironfounders, Limited, bath division, has died aged 58, after a long illness. Mr. Nicholson had been with the group since 1916.

Mr. ALBERT HOLROYD, senior sales manager of Swift Levick & Sons, Limited, Clarence Street Steelworks, Sheffield, died suddenly on September 7 at the age of 66. He had been with the firm for 50 years and was at work there on the day before his death.

Chairman of the North of England Ironfounders' Association, Mr. JAMES DUNCAN CARMICHAEL, has died at the age of 69. He was chairman of Carmichael Bros., Limited, the South Shields (Co. Durham) firm of ironfounders which his grandfather started in 1860. Mr. Carmichael was a past-president of the Newcastle and district branch of the Institute of British Foundrymen, and both president and secretary of the North-east branch of the Institution of Mechanical Engineers. He was also a past-president of the National Ironfounding Employers' Federation and a vice-president of the Council of Iron Foundry Associations.

The death is announced of Sir ARTHUR P. M. FLEMING, C.B.E., at the age of 79. As head of the research department of the Metropolitan-Vickers works at Trafford Park, Manchester, he was well known in foundry circles. Sir Arthur's main interests were research and industrial education and many who were trained at Trafford Park have held, or are now holding, positions of eminence in the foundry industry. For example, it will be remembered that Dr. J. G. Pearce, O.B.E. was until recently director of the British Cast Iron Research Association, and Mr. Tom Makemsom, late IBF secretary, were amongst his staff. The scientific side of Sir Arthur's work on submarine detection was recognized by the award of the C.B.E. in 1920. During his long life he was the recipient of many academic honours, which included the Faraday and Hawksley medals, and doctorates from the universities of Manchester and Liverpool.

Personal

Mr. C. F. HEWLETT has been appointed sales representative, East Anglian area, for E. Boydell & Company, Limited, Manchester.

Mr. D. H. DU RIEU has been appointed to the board of Metalife Corrosion, Limited, an associated company of Metalife Liquid Metals, Limited, Harrogate.

Mr. J. A. KILBY, Mr. A. REID and Mr. D. J. GRAHAM have been appointed directors of Colville Constructional Company, Limited, a subsidiary of Colvilles, Limited.

Mr. A. L. HOOD has been appointed a director of Geo. W. King, Limited. He is a director of Associated Electrical Industries, Limited, as well as of other companies.

Mr. R. H. WEIR, at present director-general of engine research and development, has been appointed director of the National Gas Turbine Establishment at Pyestock in succession to Mr. H. CONSTANT.

Mr. A. D. BERK has retired from the board of F. W. Berk & Company, Limited, having completed 55 years service with the company. He was appointed chairman in 1942. Mr. C. H. TURNER is Mr. Berk's successor.

Mrs. MARGARET W. BROWN, whose husband is managing director of Brown's Foundry, Limited, Nottingham Road, Derby, has been appointed a Justice of the Peace for Derbyshire. Mr. Brown already sits on the bench at Derby.

Sir DONALD PERROTT has been appointed to the board and chairman of J. A. Stirling, Limited, civil engineers and contractors of Welwyn Garden City. He is a deputy chairman of Dewrance & Company, Limited, and a director of United Gas Industries, Limited.

Thomas Marshall & Company (Loxley), Limited, announce that Mr. W. T. HALE has been appointed assistant managing director on sales and commercial matters, and Mr. T. A. MARSHALL, assistant managing director generally responsible for production and works' control.

Mr. JAMES H. GOSS, vice-president and group executive of the General Electric Company, Limited, and Mr. JAMES A. RICHARDSON, vice-president of James Richardson & Sons, Limited, have been elected directors of the International Nickel Company of Canada.

Mr. ROBERT BARBER, A.C.I.S., has resigned his position as director and secretary of the British Steel Founders' Association in order to take up an appointment in industry. Mr. JOHN BOLTON, at present secretary of the British Steel Castings Research Association, has been appointed to succeed him as from October 1.

Mr. J. WORTLEY, who joined the board of R. & A. Main, Limited, in 1958, and has been deputy managing director since 1959, has been appointed managing director of the company. Mr. Wortley is also a director of Main Enamel Manufacturing Company, Limited, a member of the Glover & Main group.

A presentation was made recently to Mr. LIONEL ROY BROWNSEY, director and company secretary of John Smith & Company (Derby), Limited, founders and engineers, to mark his completion of 25 years' service. Mr. Brownsey, who joined the company in 1935 as an apprentice machinist, was made a director in 1948 and company secretary in 1953.

Mr. H. F. AKEHURST, Mr. R. M. FAIRFIELD, and Mr. W. C. HANDLEY have been appointed assistant managing directors of British Insulated Callender's Cables, Limited. Mr. E. BOWYER and Mr. C. H. B. PIPKIN have been appointed executive directors. Sir RONALD SCOBIE, who has been a director of the company since 1947, has retired from the board.

The Rt. Hon. FREDERICK ERROLL, M.P., Minister of State at the Board of Trade, will visit Colombia, Ecuador, Peru, Chile, Argentina, Uruguay and Brazil between October 14 and November 17. The Minister will see as much as he can of the contribution already made by United Kingdom firms to economic development in South America and he will discuss the further opportunities for increasing trade with these countries.

Mr. PETER JOHN DAGLISH, manager of the English Electric Aircraft Equipment Division at Bradford, has been appointed special executive responsible to the managing director of D. Napier & Son, Limited. He has been manager of the division at Bradford for seven years, after joining English Electric steam-turbine department at Rugby in 1946. D. Napier & Son, Limited, is a member of the English Electric group.

Metal Industries, Limited, announce the following appointments:—Mr. D. L. FREEMAN has been made a director of Cox & Danks, Limited, responsible for the London branch of the company. Mr. Freeman, who joined Cox & Danks in 1934, was previously a manager in the London branch. Mr. B. W. G. GURNEY has been appointed managing director of Farmer Brothers (Shifnal), Limited; he was previously works director of another M.I. company, John Allan & Company (Glenpark), Limited. Mr. C. G. ABEL has been appointed general sales manager of Farmer Brothers.

Mr. H. PEARSON, has been appointed a director of the aero-engine division of Rolls-Royce, Limited, and chief engineer (performance and research). He has been associated with the company for 20 years. Other appointments include:— Mr. R. NICHOLSON to be a director of the aero division and divisional general manager of production, and Mr. R. M. KENDALL, former general manager of Rolls-Royce of Canada, to be general manager, sales and service, in the aero division. Mr. J. WOOD is to become the new general manager and vice-president of Rolls-Royce of Canada, with Mr. D. BOYD as his deputy.

Mr. DAVID KING, technical Press officer to United Steel Companies, Limited, Sheffield, flew to Naples on September 11 to attend the annual meeting of the chairmen and secretaries of the Federation of European Industrial Editors' Association. He deputized for his chairman, and also acted as vice-chairman of the British Association of Industrial Editors. The Association is made up of the men responsible for the 600 house magazines in industry affiliated to the Association. At the meeting, the European Federation discussed, among other things, plans for a congress to be held in Vienna next year.

Distillers Company, Limited, announces the formation of a development division in its industrial group under Dr. H. M. STANLEY as controller, who will be located at 21, St. James's Square, London, S.W.1. The following appointments have also been made. Mr. C. E. HOLLIS, manager, central research department, Great Burgh, Epsom, Surrey, and Mr. G. P. ARMSTRONG and Dr. H. W. ASHTON, managers, respectively, of the licensing and planning departments, at 21, St. James's Square. The main responsibilities of the division will be the direction and co-ordination of the company's research, forward planning and licensing activities, particularly in the fields of chemicals and plastics.

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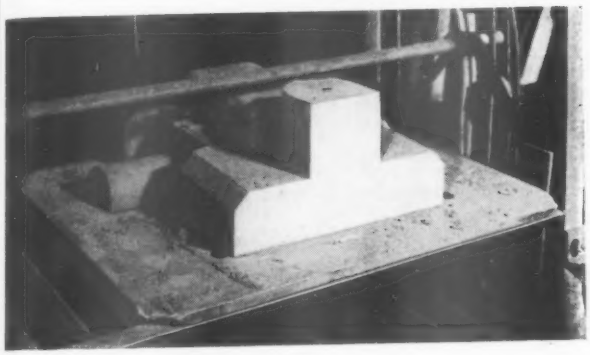

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Company News

BROMILOW & EDWARDS, LIMITED, engineers, of Bolton—Interim dividend is being increased by 1 per cent. to 7 per cent. in respect of the year to November 30, 1960. The 1958-59 total was 15 per cent.

THOMAS BLACKBURN & SONS, LIMITED, constructional engineers and ironfounders, of Preston—The directors state that the company's progress justifies payment on September 30 of a dividend for 18 months from April 1, 1959, to September 30, 1960, on the 6 per cent. cumulative preference shares.

JAMES H. LAMONT & COMPANY, LIMITED, engineers and brassfounders, of Edinburgh—An interim dividend of 4¼ per cent. is announced in respect of 1960, which compares with the equivalent of 3¼ per cent. for 1959. A total equal to 20 per cent. on the present capital, as increased by a 50 per cent. scrip issue, was paid last year.

JOHN THOMPSON, LIMITED, makers of boilers and ancillary equipment, nuclear-power plant fabrication, etc., of Wolverhampton—The interim is reduced from 7½ per cent. to 5 per cent. in respect of 1960. A final of 12½ per cent. made a total of 20 (25) per cent. for 1959. Group net profit for 1959 dropped from £501,055 to £324,311.

TIMKEN ROLLER BEARING COMPANY, LIMITED—Sales and earnings this year will not match the records set last year, states Mr. W. R. Timken, president. For 1959 the company reported record sales of $262,093,455, while earnings set a new peak at $29,856,040. The sharp drop in steel operations this year, plus a decline in the industrial bearing line business had more than offset a marked increase in railroad bearing orders and the continued good volume of automotive business and foreign operations.

ALUMINIUM CORPORATION, LIMITED—Trading profits amounted to £296,139 in the year ended July 31, 1960, compared with £142,793 for the previous seven months. The dividend is 22½ per cent. against a distribution of 15 per cent. for the previous period, which included a jubilee bonus of 5 per cent. After all charges, the net profit is £143,928, against £55,337.

ALEXANDER STEPHEN & SONS, LIMITED, shipbuilders and repairers, etc., of Govan, Glasgow—Dividend is restored with a 10 per cent. payment for the year ended March 31, 1960. Another 2½ per cent. capital distribution is to be paid, making 5 per cent., tax free. Net profit was £329,639, after tax of £152,537 (£7,088), compared with a loss of £34,733 previously which resulted from a trade union dispute.

W. H. ALLEN, SONS & COMPANY, LIMITED, electrical, mechanical, and hydraulic engineers, of Bedford—The offer to purchase the capital of William Foster & Company, Limited, will close on October 4 or not later than October 25. If the offer becomes unconditional it is intended that the board of William Foster shall remain unchanged and that the remuneration of the directors be increased by a total of £5,000 a year as from March 1, 1960.

A.P.V. COMPANY, LIMITED, makers of process plant and equipment, etc., of Crawley (Sussex)—The directors propose to make a free scrip issue of one-for-five involving capitalizing £250,000 from reserves. The board also foreshadows maintaining on the increased capital the 8½ per cent. dividend. This would mean an effective increase to 10.2 per cent. on the present basis. Trading for the first half of the current year is better than for the corresponding period last year.

ATLAS COPCO, AB, compressed-air engineers, Sweden—Share capital of the company is to be increased from 63,000,000 kr. to 76,650,000 kr. by the issue of 546,000 shares at a par value of 25 kr. per share. The issue is confined to the shareholders of Svenska Diamantberg Borrnings, AB. It follows acceptance by holders of 97 per cent. of Diamantberg shares of the Atlas Copco offer, made in June this year, of five Atlas Copco shares for one SDB share plus 30 kr. in cash.

TIPPER INDUSTRIES, LIMITED, ironfounders, of Birmingham—An interim dividend of 5 per cent. on the £1,200,000 ordinary 5s. shares is to be paid. Last year an interim of 7½ per cent. was paid, but since then the ordinary capital has been doubled by a free scrip issue of one-for-one. The effective comparison with the present payment is thus 3¾ per cent. The board warns, however, that the increase does not necessarily indicate a higher total dividend.

CHARLES ROBERTS & COMPANY, LIMITED, carriage and wagon builders, and financiers, near Wakefield (Yorks)—The company is not paying a further dividend on the ordinary capital for the year ended March 31, 1960, but recommends the distribution of £69,908, forming part of the realized accretions to capital now standing to credit of capital reserve, at the rate of 3d. for each 5s. ordinary unit. A maintained interim of 7½ per cent., less tax, has already been paid in respect of 1959-60. The 1958-59 total dividend was 15 per cent.

ADA (HALIFAX), LIMITED, machine-tools, and domestic electric-appliance manufacturers, of Halifax (Yorks)—In connection with the bid from Philips Electrical Industries, Limited, Mr. W. D. Gibbs, chairman, states that the Ada accounts for the four months to July 31 last, show a trading profit of only £4,878, which is likely to be more than absorbed by the expected loss for August. He adds that it is unlikely that an early solution of the difficulties will be found, and the directors cannot hold out any hope of an interim dividend. As announced, acceptance is recommended by the board.

Hawker Group expansion in Nuclear-power Field

Nuclear Engineering, Limited, formerly a subsidiary of G. A. Harvey & Company (London), Limited, has been acquired by Hawker Siddeley Nuclear Power Company, Limited, a member of the Hawker Siddeley Group, Limited. Nuclear Engineering has been engaged in the manufacture of equipment for handling and using radio isotopes, but under its new management it will concentrate on irradiation equipment, for which a number of orders have already been received from universities and research organizations at home and oversea.

The company's activities in the field of industrial radiography have been taken over by Pantatron, Limited, London, W.1.

The Hawker Siddeley Group, Limited, this week announced two further acquisitions and the formation of a new subsidiary. The Kenton Engineering Company, Limited, general engineers, of Rothley (Leics), and Nuclear Engineering, Limited, have become subsidiaries, and Hawker Siddeley Brush (Central Africa) (Private), Limited, has been formed and registered in Central Africa.

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AP81

Raw Material Markets

Iron and Steel

Most of the ironfoundries maintain substantial outputs, with the makers of high-duty castings continuing to be the most favourably employed. The engineering foundries catering chiefly for the motor vehicle trade are busy, and outputs of castings from these foundries have so far shown little variation on previous tonnages, although from some sections of this trade pressure for supplies has now eased. In consequence there is a possibility of some curtailment in delivery schedules. Many other consumers of high quality castings continue to specify freely. The demand for castings from the building trades keeps the light foundries well occupied, but foundries catering for the domestic utensil trade are short of work and some are only engaged on a four-day working week. The jobbing and textile foundries have a fair amount of work on hand, but in common with the light foundries they could undertake more business as capacity is not fully absorbed.

Pig-iron in all grades is adequate to meet the needs of consumers for both consumption and stock requirements. Production of basic pig-iron is substantial and the steelworks are fully absorbing outputs, which are being used in increasing quantities on account of the shortage of scrap. The foundries have no difficulty in obtaining the required tonnages of pig-iron, and producers could increase on present deliveries if demand warranted. Overall outputs of the low-phosphorus irons, which are specified more freely than other grades, are sufficient for the requirements of the engineering and speciality foundries which also utilize good quantities of hematite and some refined irons. Available supplies of high-phosphorus pig-iron is in excess of requirements of the light, jobbing, textile, and some of the engineering foundries which use this grade.

Stocks at the furnaces continue to be reduced by consignments to overseas buyers. Apart from special grades of scrap, the foundries are well supplied. Foundry coke deliveries are satisfactory and ganister, limestone, and firebricks are in good supply.

The re-rollers maintain good outputs consistent with the labour available, which is below requirements. Most have good order-books for all products and there is a consistent demand for small bars and light sections as well as reinforcing rods. The re-rollers in the English Midlands are well provided with steel semis in the lower carbon ranges, but scarcity still exists in the higher carbons and special grades of steel, and this is also applicable to other areas.

Non-ferrous Metals

Copper prices in London have held remarkably steady considering the present state of supply and demand. Some of the market support is still coming from the producers, but the main prop is the now strong possibility of a strike at Chuquicamata. If this strike does materialize present price levels may well be held in the hope that consumer demand will improve with the coming of the winter months. If it does not, then copper producers may consider some kind of voluntary scheme whereby output is restricted. Last week stocks of copper in LME warehouses rose by no less than 769 tons to 8,793 tons, the highest figure for almost a year.

The US market is weaker than that in London and the price structure there would almost certainly have been altered downwards had it not been for the almost certain prospect of the strike at Chuquicamata. As it is, demand is slow, Wall Street is very shaky, and economists have all turned out pessimistic reports on the business outlook. The quotation of 33 cents a pound, however, still stands in the names of the producers and custom smelters in spite of the further fact that scrap is now on offer at 25 cents a pound.

Tin is a reasonably firm market in London, the East, and in New York where the price is around $1.02 cents a pound. In London, demand is quietly steady on a market short of nearby supplies. This should only be a temporary situation, but it must be borne in mind that world supply and demand figures are nearly in balance and the outlook on both sides of the Atlantic for consumption in the months ahead is good.

Consolidated Tin Smelters has announced its decision to build a smelter in Nigeria for the treatment of Nigerian ores, in accordance with the Nigerian Government's wishes that these ores should be processed locally. At present, Nigerian ores are smelted in the UK.

Lead is a better market in London following the Lead and Zinc Study Group's decision to maintain restrictions on supplies. Nevertheless, this has only resulted in price levels being held. The outlook has not changed and the quotation will have a hard time going far above its present level of around £70 a ton. In the US the market is also weak and the price unchanged at 12 cents a pound.

Zinc continues weak following the Lead and Zinc Study Group's decision not to take any action regarding supplies. This is because present stocks are not considered abnormally high. However, production is running ahead of consumption and stocks will go higher in the months ahead unless demand improves considerably on both sides of the Atlantic. In the US the price is unaltered at 13 cents a pound.

Recent Orders

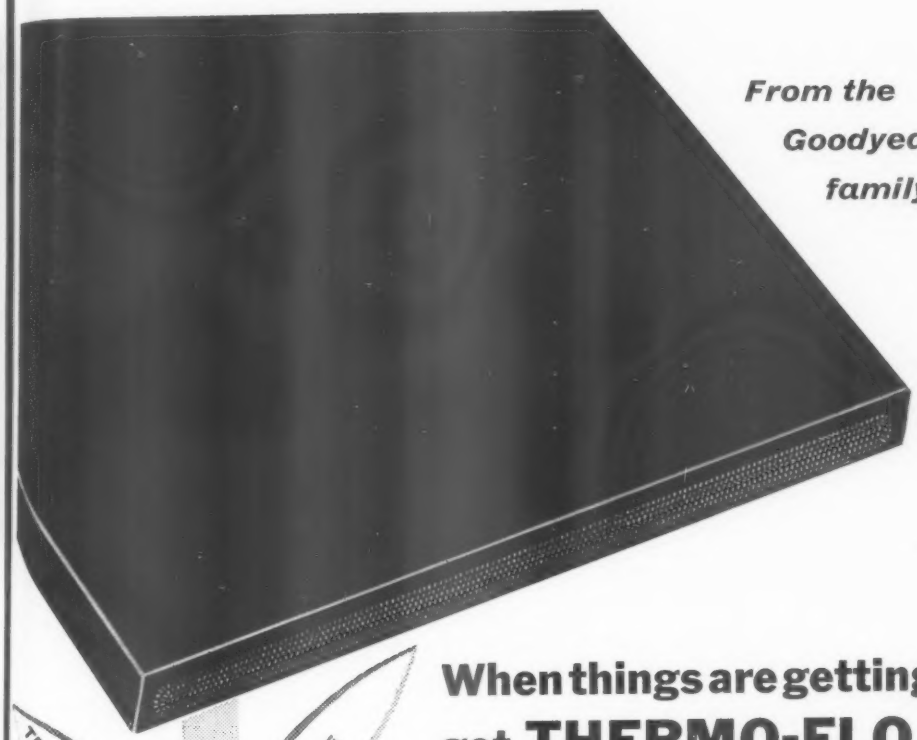
ORDER worth about £150,000 has been received by Rolls-Royce, Limited, for diesel engines and torque converters to power 50 new single-engine shunting locomotives to be built for the Swedish State Railways by Kalmar Verkstads A.B.

CONTRACT for two 48-in. suspended "Allen-Stork" mixed-flow condenser circulating-water pumps and motors for Calgary Power Company, Limited, Canada, has been awarded to W. H. Allen, Sons & Company, Limited, Bedford. The pumps, which are rated at 37,800 gallons per minute each, are driven at 393 r.p.m. by 500-h.p., 60-cycle motors.

FOUR-CYLINDER diesel engines for use in German-built fork lift trucks are to be supplied by Perkins Engines, Limited, Peterborough. The order is worth nearly £150,000 and has been placed by Ruhr Intrans Hubstapler, GmbH, Mulheim. The engines will be fitted in the US-designed Clarklift 2½- and 3½-ton fork lift trucks manufactured by the German company.

GRANGE DOCK, Grangemouth, is to have 22 new electric cranes. An order for 16 6/3-ton, and two 10/3-ton cranes has been placed with Stothert & Pitt, Limited, Bath, by British Transport Docks, while four 7½/4-ton units capable of dealing with general traffic or discharging bulk dry cargo by grab are to be supplied by Cowans Sheldon & Company, Limited, Carlisle.

TENDER of £27,257 submitted by Thos. W. Ward, Limited, Sheffield, for the construction of crane and railway tracks at the No. 1 and No. 2 deepwater berths being built at Lackenby (Yorks) has been accepted by the Tees Conservancy Commission. The work is to be undertaken by the Darlington Railway Plant & Foundry Company, Limited, a Thos. W. Ward subsidiary.



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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

September 21, 1960

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £26 6d. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over; N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 7s. 6d.; Birmingham, £25 14s. 0d.; Wales (Welsh iron), £23 19s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(per ton unless otherwise stated, delivered)

Ferro-Silicon (6-ton lots and over).—45 per cent. Si, £43 10s. 0d. to £46 0s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £59 0s. 0d. to £63 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 20s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 12s. 1d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 15s. 1d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £81 10s. 0d. to £84 10s. 0d., basis 60 per cent. Cr. scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.10 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 11d. to 2s. 1d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £275 0s. 0d.; 96/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £61 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—BASIC: soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (1 ton to 10 tons).—Ship plate (N.-E. Coast), £41 12s. 0d.; boiler plates (N.-E. Coast), £44 2s. 0d.; floor plates (N.-E. Coast), £43 10s. 0d.; angles (N.-E. Coast), £38 16s. 6d.; joists (N.-E. Coast), £38 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £68 5s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £67 17s. 0d.; nickel-chrome, £98 11s. 0d.; nickel-chrome-molybdenum, £111 4s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £236 5s. 0d. to £236 10s. 0d.; three months, £237 0s. 0d. to £237 5s. 0d.; settlement, £236 10s. 0d.

Copper, Tubes, etc.—Solid-drawn tubes, 2s. 3⅝d. per lb.; rods, 250s. 0d. per cwt. basis; 20 s.w.g., 285s. 0d. per cwt.

Tin.—Cash, £806 10s. 0d. to £807 0s. 0d.; three months, £804 10s. 0d. to £805 0s. 0d.; settlement, £807 0s. 0d.

Lead (Refined Pig).—First half September, £69 17s. 6d. to £70 0s. 0d.; first half December, £70 2s. 6d. to £70 5s. 0d.

Zinc.—First half September, £87 0s. 0d. to £87 10s. 0d.; first half December, £86 5s. 0d. to £86 7s. 6d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £123 12s. 6d.; rolled zinc (boiler plates), all English destinations, £121 7s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £100 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 10⅞d. per lb.; sheets to 10 w.g., 206s. 0d. per cwt.; wire, 2s. 8⅝d.; rolled metal, 206s. 0d. per cwt.

Brass (Brazing).—BS1400, B3, £172; B6, £223.

Brass (High Tensile).—BS1400, HTB1, £197; HTB2, £214; HTB3, £231.

Gunmetal.—BS1400, LG2, £217; LG3, £227; G1, ½%, £286; G1, 1%, £273.

Phosphor Bronze.—BS1400, PB1 (AID released), £311; BS1400, 90/10/1, £298.

Leaded Phosphor Bronze.—BS1400, LPB1, £238.

Phosphor Bronze Strip, etc.—Strip, 293s. 3d. per cwt.; wire, 4s. 1⅝d. per lb.; rods, 3s. 4½d.; tubes, 3s. 4½d.; chill cast bars, solids 3s. 4½d.; cored 3s. 5½d (CHARLES CLIFFORD, LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 11½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 4½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 3½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 2½d. to 2s. 3d. per lb.; Antimony, English, 99 per cent., £200 0s. 0d. Quicksilver, ex-warehouse, £69 0s. 0d. to £69 10s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £252, AB2, £261.

* Average 68-70 per cent.

Increases in Capital

ASHTON YOUNG ENGINEERING DEVELOPMENT COMPANY, LIMITED, increased by £7,500, in £1 shares, beyond the registered capital of £5,000.

NORTH DOCK ENGINEERING COMPANY, LIMITED, increased by £22,000, in £1 ordinary shares, beyond the registered capital of £3,000.

TRUFORM GAUGE COMPANY, LIMITED, Walsall, increased by £18,000 in £1 ordinary shares, beyond the registered capital of £2,000.

STEEL RADIATORS, LIMITED, Southall (Middx), increased by £70,000, in £1 ordinary shares, beyond the registered capital of £50,000.

BARKING ZINC OXIDE, LIMITED, London, E.C.4, increased by £60,000, in £1 ordinary shares, beyond the registered capital of £40,000.

METAL CONSTRUCTIONS, LIMITED, Worcester, increased by £10,000, in £1 ordinary shares, beyond the registered capital of £50,000.

TAP & DIE CORPORATION, LIMITED, London, W.1, increased by £1,500,000, in 5s. ordinary shares, beyond the registered capital of £1,500,000.

ROTARY HOES, LIMITED, West Horndon (Essex), increased by £50,000, in 5s. ordinary shares, beyond the registered capital of £1,250,000.

J. W. COLPITTS & COMPANY, LIMITED, engineers, etc., of Blyth, increased by £34,000, in £1 shares, beyond the registered capital of £1,000.

BORG SERVICE, LIMITED, boilermakers and cleaners, of London, W.C.2, increased by £29,000, in £1 shares, beyond the registered capital of £1,000.

BLATTER ENGINEERING COMPANY, LIMITED, London, N.9, increased by £14,000, in £1 shares, beyond the registered capital of £1,000.

T. R. CREFFIELD & SON, LIMITED, engineers, etc., of London, W.11, increased by £15,000, in £1 shares, beyond the registered capital of £20,000.

SOVEX, LIMITED, engineers, etc., of Erith (Kent), increased by £125,000, in £1 ordinary shares, beyond the registered capital of £75,000.

LORRAINE ENGINEERING COMPANY, LIMITED, London, S.W.7, increased by £5,900, in £1 ordinary shares, beyond the registered capital of £100.

LANCELEYS, LIMITED, founders, engineers, etc., of Chester, increased by £1,000, in £1 ordinary shares, beyond the registered capital of £2,500.

FARNWORTH DIE CASTING COMPANY, LIMITED, Blackburn, increased by £9,000, in £1 ordinary shares, beyond the registered capital of £1,000.

BURGESS & COMPANY (ENGINEERS), LIMITED, Bracknell (Berks), increased by £44,000, in £1 ordinary shares, beyond the registered capital of £6,000.

HAMILTON PERRYN (ENGINEERS), LIMITED, Stanmore (Middx), increased by £4,000, in £1 ordinary shares, beyond the registered capital of £1,000.

JAMES BOOTH ALUMINIUM, LIMITED, Birmingham 7, increased by £5,000,000, in £1 "B" ordinary shares, beyond the registered capital of £5,000,000.

MARTIN HOIST & ENGINEERING COMPANY, LIMITED, London, W.1, increased by £6,900, in £1 ordinary shares, beyond the registered capital of £100.

WALTER KORNER, LIMITED, engineers, etc., of London, W.1, increased by £4,500, in £1 ordinary shares, beyond the registered capital of £500.

THOMPSON & ENGINEERING COMPANY, LIMITED, Daventry, increased by £2,000, in 2s. 6d. ordinary shares, beyond the registered capital of £1,000.

Board Changes

F. PERKINS, LIMITED—Mr. A. J. Scamp has been appointed to the board from which Mr. G. E. Smith has resigned.

ANDERSONS RUBBER COMPANY, LIMITED—Mr. W. M. Meacham has been appointed a director. He will continue as secretary.

METAL CLOSURES, LIMITED—Miss J. R. Sherriffs has resigned as a director of the company and of its subsidiaries, Plastic Closures, Limited, and Johnson Brothers (Closures), Limited.

US INDUSTRIES INC. (GREAT BRITAIN), LIMITED—Mr. John Boardman has been appointed deputy chairman..... He is also deputy chairman of Burtonwood Engineering Company, Limited, the manufacturing facility of USI, which was acquired last October.

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SHOTBLASTING MACHINERY
FOUNDRY MACHINERY

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Publications Received

Annual Report of the Rural Industries Bureau, 1959-60. Published by the Trustees of the Bureau from 35, Camp Road, Wimbledon Common, London, S.W.19.

If readers of the FOUNDRY TRADE JOURNAL associate rural industries as being confined to thatching and shoeing smiths, a perusal of this Report will soon disillusion them. Some of the industries catered for employ as many as 20 skilled men; apparently such works can claim affiliation because they are located in a village or a small town. The Bureau is now extending its scope to include instruction on work-study and has published a pamphlet on "Exports Made Easy." It operates an experimental workshop and keeps its members informed of the results of research carried out by State-sponsored organizations devoted to these activities. The major source of income for the Bureau is a £138,500 Treasury Grant and as far as can be gathered, the help which can be given is restricted to smallish concerns located in rural areas. There are no affiliation fees, and after staff salaries and the like are deducted the major item on the payments side of the Bureau's account is travelling expenses—the services given being mainly of the practical type, carried out at the village where the affiliated member is located.

Steel Review, No. 19. Published (quarterly) by the British Iron and Steel Federation, Steel House, Tothill Street, London, S.W.1.

This issue has several articles of outstanding interest. One is entitled "Financing Further Expansion," which indicates that in the future the iron and steel industry, having such a good production record, can turn to the market for new capital. The second article deals with the European Coal and Steel Community and stresses how the setting up of this body has resulted in the creation of the Common Market, a political body of great international importance. A third noteworthy article, divided into three sections—"The Motor Age," "Steel for the Motor Age," and "Britain's Roads"—should be studied by all those hundreds of concerns supplying parts to the automobile industry, as future prospects for that industry are carefully analysed. The magazine, as usual, is profusely and well illustrated and documented with numerous graphs and tables.

British Standards Institution Annual Report, 1959-60. Published from British Standards House, 2, Park Street, London, W.1: price 7s. 6d. net.

This report gives the information that there are now about 17,500 committee members on the Institution's records. During the year under review, 297 standards were added to the existing list, whilst the sales department dealt with orders for about 1,100,000 publications. It is stated that the certification marking scheme is making but gradual progress: interest should accelerate, however, as the number of standards under which the B.S. "Kite" mark is now used has risen from 145 to 170. At the moment 1,447 licences to use the mark have been issued. A considerable amount of space in the report is devoted to the work of the International Organization for Standardization (ISO). Further work might usefully incorporate reviews of some of the activities undertaken by the international associations of trade and technical bodies. The major part of the book, which runs to 280 pages, is taken up with divisional and committee reports and the listing of committee membership.

Coal: The Price Structure (4th Edition). Published by the Federation of British Industries, 21, Tothill Street, London, S.W.1; price 2s. 6d.

The coals referred to in this the fourth edition of the booklet are those used by industry. A new edition had become necessary—and will be welcomed by large buyers of coal—because of changes which had been made in the factors and values on which prices are based. As the system is fairly complicated, fuel buyers should keep this new edition handy, as it indicates where potential economies are to be sought.

British Coal Utilization Research Association Annual Report, 1959. Published from Randalls Road, Leatherhead, Surrey.

Makers of domestic boilers and space-heating apparatus are vitally interested in the work undertaken by BCURA, but many other foundry concerns also are members. Quite a high proportion of this report is devoted to the interests of founders making stoves and furnaces using solid fuel.

Book Review

Manual of Foundry Practice for Cast Iron, by J. Laing and R. T. Rolfe. Third edition, revised and enlarged by R. T. Rolfe. Published by Chapman & Hall, 37, Essex Street, London, W.C.2; price 51s. 6d., post free.

It is more than 25 years since the first edition of "A Manual of Foundry Practice" appeared, and this publication is now regarded as a standard text. The present volume is a third edition of the original and has been substantially revised, making it a specialist work limited to the production of iron castings. In the space of 10 chapters a remarkably wide coverage of the cast-iron field is given, metallurgy and technology receiving approximately equal attention. Much new material is now included in the technology section, shell and CO_2 moulding are given adequate consideration and the section dealing with sand testing is quite up-to-date. Sand mixtures continue to be treated in a rather empirical fashion. The metallurgy of grey cast irons, alloy irons, and spheroidal-graphite irons is sound, and there is an excellent section devoted to cupola operation and iron-melting techniques generally.

The general standard is good and there are no obvious errors. It is regrettable that the very important centrifugal-casting techniques, used for the production of pipes, cylinder liners and piston rings, should have been regarded as being too specialized for inclusion in this book, while space has been given to somewhat outmoded varieties of cast iron. This is a small defect in an otherwise excellent book which can be thoroughly recommended, not only to students, but to everyone interested in the production of cast iron.

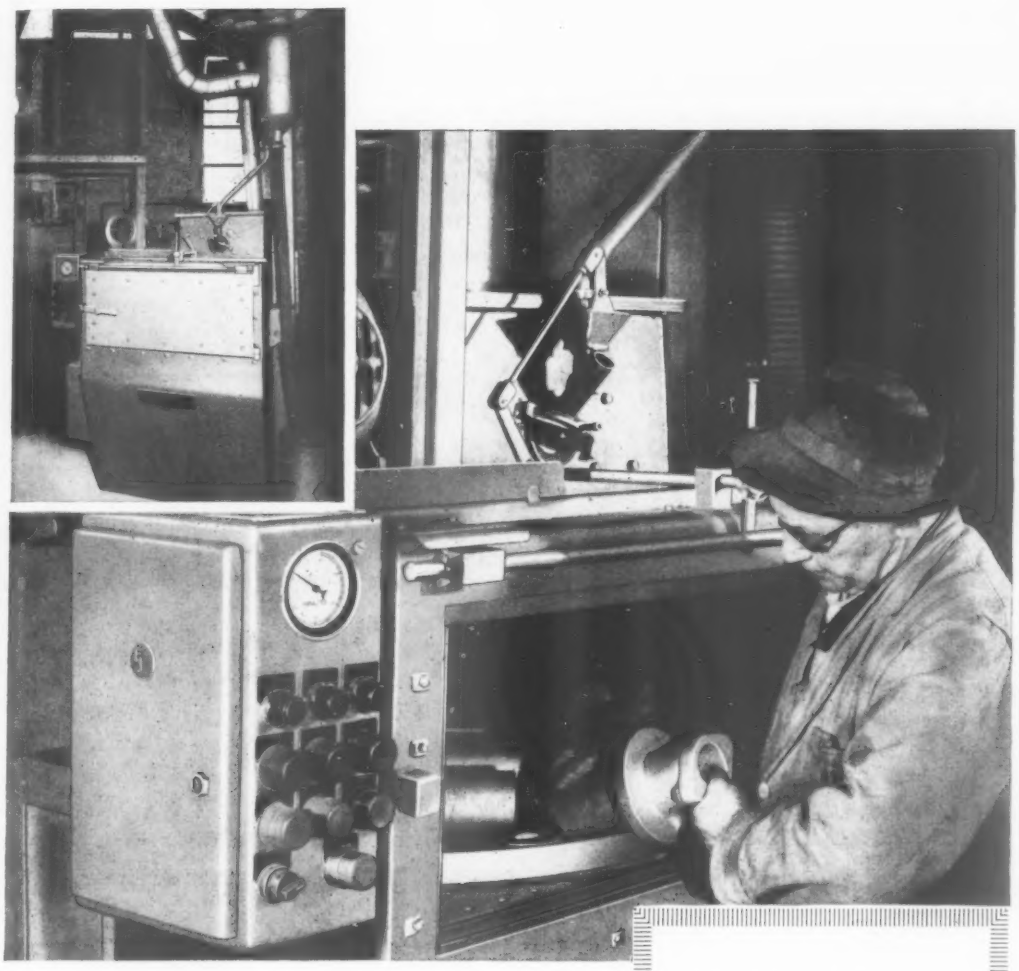
The late R. T. Rolfe was responsible for many useful publications: the volume now reviewed may well be regarded as his most valuable work.

J. B. MCINTYRE.

House Organ

Foseco Foundry Practice, No. 141. Issued by Foundry Services, Limited, Long Acre, Nechells, Birmingham 7.

This issue contains an excellent article on the wedge type of chill-test when applied as a means of controlling the properties of grey iron. Other articles cover metal/mould reaction in non-ferrous alloys and a study of a case of porosity in aluminium-bronze castings.



Baker Perkins Foundry Machinery at work ... *at the Southend Engineering Co. Ltd.*

This Baker Perkins Girojet Universal Shot Blasting Machine operates without compressed air, needs negligible maintenance and costs little to run. And here's another advantage—no foundations are needed. The Girojet will take an evenly distributed load of 500 lbs. Average shotblasting times: aluminium (2-4 minutes); grey iron (3-6 minutes); malleable cast iron or bronze (4.5-8 minutes); forged steel or stamped steel (10-20 minutes).

This is the machine that completely replaces the hand cabinet.

Please write for full details today.

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HISTORICAL NOTE

Southend Engineering Company was established in 1901, and manufactured Marine and Stationary engines until 1914. The Firm has produced its own non-ferrous castings since 1938. They manufacture the "Viking 3" Outboard Motor, a set of flame guns for agricultural purposes, and a range of Stern Gear and fittings for marine engine manufacturers.

BP/F10

CLASSIFIED ADVERTISEMENTS

PREPAID RATES: Fifteen words for 7/6 (minimum charge) and 4d. per word thereafter. Box Numbers 2/6 extra per insertion (including postage of replies). Situations wanted 2d. per word throughout.

Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Monday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

YOUNG MAN, 30, well educated, City and Guilds Foundry practice and Diploma National Foundry College, executive, laboratory and sales experience, seeks interesting position in the foundry or allied industries in the London area. Prospects more important than starting salary. Box YM803, FOUNDRY TRADE JOURNAL.

FOUNDRYMAN, 35, B.Sc., A.M.I.B.F., looking for a new post. Knowledge and experience of iron, steel and non-ferrous founding. Would consider technical, supervision, management or representation. Prospects as important as initial salary. Box FO814, FOUNDRY TRADE JOURNAL.

FOUNDRY SUPERINTENDENT/METALLURGIST (42), returning to U.K. from South Africa, towards end of October seeks position in either Grey Iron and/or Malleable Foundry as Foundry Technician or Metallurgist. All replies will be acknowledged. Box FS824, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER/CHIEF A.I.D. INSPECTOR, non-ferrous, 38, 20 years' metallurgical and laboratory background, familiar with the production of specification alloys from all types of raw materials, including refinings, desires position with metal manufacturer. Box FM829, FOUNDRY TRADE JOURNAL.

FOUNDRY TECHNICIAN (23), City and Guilds Foundry Practice and Patternmaking Certificates, served metallurgical apprenticeship with iron foundry, seeks interesting position in the foundry or allied industries in U.K. or abroad. Box FT832, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

FOUNDRY EXECUTIVE—A Foundry Executive, aged 35-45, is required by a West Midlands Mechanised grey iron foundry. The successful applicant must possess a practical foundry background, plus experience in technical development. The position carries a commencing salary of £2,650 and is superannuated. Box FE828, FOUNDRY TRADE JOURNAL.

PRESSURE DIE CASTING. Excellent opportunity for experienced PRESSURE DIE CASTING TECHNICIAN, aluminium alloys. Man with both practical and technical experience required for planning and operating new department. Please state details of experience and salary required to Box PJ833, FOUNDRY TRADE JOURNAL.

APPLICATIONS are invited from FOUNDRY SALES REPRESENTATIVES with experience of all foundry work who are prepared to live in the Midland area. Good salary. Car and general expenses. Age 25/35. Only those with foundry experience need apply. Box AP834, FOUNDRY TRADE JOURNAL.

FOUNDRY METALLURGIST required for Ferrous Foundry (mechanised) situated in East Anglia. Cupola control essential and must have practical experience in sand control. Send details of experience, age and salary to Box FM806, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

FOUNDRY METALLURGIST required for modern Mechanised Cylinder Block and Head Foundry. Practical experience in Cupola Operation and knowledge of technique required to produce cylinder irons to close analytical limits. Excellent opportunity for Metallurgist in the age range 24-30 to join an expanding organisation producing castings for the automobile industry. Assistance with housing if required. Please apply giving details of experience to Box FM 826, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

FOUNDRY FOREMAN. — William Foster & Co., Ltd., (Gwynnes Pumps, Ltd.), Lincoln, have a vacancy for a man experienced in grey iron and non ferrous castings up to one ton, using both floor and mechanised methods. Must be capable of training labour and directing operations on shop floor. Superannuated pension scheme, assistance given on housing. Applicants should give full details of previous experience, technical education and age to Personnel Manager.

Foundry Manager

is required for a modern foundry producing approximately 300 tons of light high duty iron castings and some S.G. iron castings weekly.

Applicants should preferably have had a metallurgical training and should be familiar with Budgetary Control and modern methods of production including Shell Moulding.

The position is pensionable.

Applications, giving full details of experience, qualifications etc. should be submitted to: BOX No. FM 836, FOUNDRY TRADE JOURNAL

MSL *have been retained to advise on the appointment of a*

FOUNDRY MANAGER

to take charge of the production programme of a company in Ireland. The foundry employs fifty people and is being progressively mechanised, and it would be the responsibility of the Manager to apply effective supervisory and technical methods so as to ensure efficient and profitable growth.

Applicants must be practical furnacemen and moulders with a minimum of five years' experience on production of carbon and alloy steels (including austenitic manganese), operating electric arc furnaces with hand and machine moulding. Experience in the operation of side-blown converters would be advantageous.

Salary £2,000 per annum, plus non-contributory pension, and removal expenses from the United Kingdom. Please send brief details in confidence quoting reference GT.2618 to D.S.A.E. Jessop.

MANAGEMENT SELECTION LIMITED
17, Stratton Street, London, W.1

In no circumstances will a candidate's identity be disclosed to our client unless he gives permission after a confidential interview at which he will be given full details of the appointment.

SITUATIONS VACANT—*contd.*

SMALL IRON FOUNDRY, Staffordshire, producing high duty castings by sand and shell moulding process, require FOUNDRY MANAGER. Must be fully experienced. Excellent prospects. Please give full particulars, including salary expected, to Box SM825, FOUNDRY TRADE JOURNAL.

DIECASTING. FOUNDRY MANAGER with practical experience in the control of labour and production of Gravity Diecastings in Aluminum, Brass and Aluminium Bronze, knowledge of die design, cost control, estimating and able to work on own initiative, for expanding foundry. Excellent prospects for the right man. Full details to PERSONNEL MANAGER, CHARLES CARR, LTD., Grove Lane, Smethwick.

SCOTTISH FOUNDRY producing quality Steel Castings require AGENT for Birmingham and Midlands Area. Confidential replies should give fullest details including territory covered and other products carried. Box SF835, FOUNDRY TRADE JOURNAL.

NON-FERROUS FOUNDRY SUPERINTENDENT required. A good, aggressive, production-minded man (preferably an engineer) with proven Foundry and Supervisory experience. Required for ultra modern brass, small casting, captive Foundry located in London, Ontario, Canada, and producing a wide range of repetitive pressure castings. Position backed by staff for quality, methods, budgeting, production control, maintenance, etc. Equipment includes induction melting automated and standard mechanised production lines. Applicants should apply in first instance to EMCO BRASS MFG. CO. LTD., Margate, Kent. Interviews will be arranged in London for suitable applicants on or around October 16.

FOUNDRY MANAGER required for small well-equipped Foundry in West Riding of Yorks. Applicants must have practical experience of producing ferrous and non-ferrous castings and posess a sound knowledge of both machine and floor moulding. The Company is engaged at the moment in consideration of modernisation of existing plant to produce higher grade castings with a finer finish and applicants must be capable of advising in this direction. This offers a good opportunity for a man of the right type who should be between the age of 30 and 45. Applications giving full details of previous experience and salary required to be sent to THE MANAGING DIRECTOR, Box FM834, FOUNDRY TRADE JOURNAL.

MACHINERY WANTED

GEORGE ELLISON low tension 3 phase switchgear, all capacities. Immediate inspection. WHITEFIELD MACHINERY & PLANT LIMITED, 48, Chatham Street, Stockport. Tel. 4471.

WANTED by small foundry, cheap pneumatic Chipping Chisels, Drillers, Cylinder Hoist, etc. 80/100 lbs. Bargains only. Must be good condition and make. J. WHEELER & SONS, LTD., Railway Foundry, Langley, Worcs.

WANTED, Moulding Boxes, 3 ft. square to 8 ft. Minimum depth 8 ins. Steel or cast iron. Also, Wheelabrator. Must be of recent manufacture, complete with dust extractor. Box WA830, FOUNDRY TRADE JOURNAL.

URGENTLY REQUIRED, One Foundry, Appliance & Engineering Company, 10 ft. Electric Radial Arm Sand Slinging Unit with 400/440 volt, 3 phase, 50 cycles, A.C. motorised feed elevator, conveyor and slinger, pantograph arm and mobile steel base. State price and where can be inspected. WILLEY & CO., LIMITED, Engineers, Exeter.

MACHINERY FOR SALE

TWW

BM2 Sand Mill by Foundry Equipment, capacity 4 tons per hour with electrics wound for 365 volts, 3 phase, 50 cycles.
New "Guyson" Shot Blast Cabinet, 42 in. × 30 in. × 36 in. Complete with Dust Collector and Extraction Unit. With electric wound for 400/440/3/50 cycles supply.
Morris Type "M" Screenerator, motorised for 400/3/50 cycles supply.
Wallwork type 562AY Turnover Moulding Machine, load 300 lb., pattern draw 8 in., table size 22½ in. × 17½ in.
Coleman Wallwork type CN. Jolt Squeeze Ram Pattern Draw Moulding Machine, load 600 lb., pattern draw 10 in.; suitable for boxes 20 in. × 20 in. or 25 in. × 12 in.
Shot Blast Plant, Rumbling Barrels, Furnaces, Air Compressors. Available from stock.

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F.E. SAND RAMMER, 10 ft. radius with Bucket Elevator, Storage Hopper, and feeder belt.
SCREENARATOR, 16 in. belt and Magnetic pulley.

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100 TON Horizontal Compression Tester adaptable for extra large specimens or structures.
Avery 30 ton Universal Mechanical Tensile Tester.
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Denison Creep Testers.
Fel Bar Crack Detector to 21 ft. long.
Foster Edgewise Temperature Indicators, 0 to 1,100 deg. C.
Low Temperature Cabinets to minus 65 deg. C.
Kent Ring Balance Air Flow Recorders, 0/3,000 cu. ft. per min.
L. SOLLOMAN, LTD., Beaufort Street, Manchester, 3. BLA. 4571.

Large stock of Foundry Ladles. Capacities from 5 cwt. to 10 ton. Please send for list.
Three small Cupolettes.
Pneulec motorised Sand Disintegrator.
MacNab jolt squeeze Moulding Machine.
New and unused drawer type Core Ovens, by Alldays & Onions, oil fired.
New Bale-out and Lift-out Furnaces Leaflet and photograph available.
New Polford 600 lb. capacity coke-fired furnace.
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Large stock of circular Moulding Boxes, new. Please send for list.
Sinex 5 tons capacity Shake-out Beam.
August coke-fired core oven, 6ft. by 3ft. by 8ft.
100 Keith Blackman motorised fans, sizes up to 10 H.P.
Please send for list.

ELECTROGENERATORS LTD.,
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All sizes. Rooms or Cabinets. Ex stock or prompt delivery. Low prices.
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UNUSED "MARTONAIR" Horizontal Pneumatic Cable Hoists. 300 lbs. capacity. 100 lbs. working pressure. Four-wheel articulated suspension trolley. Pendant control. £15 each plus carriage. Box UM822. FOUNDRY TRADE JOURNAL.

SAND MIXERS and DISINTEGRATORS for Foundry and Quarry: capacities from 10 cwts. to 10 tons per hr.—W. & A. E. BREALEY (MACHINERY), LTD., Misterton, nr. Doncaster. Tel.: Misterton 202.

ANDERSON-GRICE 2-ton Electric Derrick, 55 ft. Jib Crane. Slewing angle 260 degrees. For operation 400 volts, 3 phase, 50 cycles. WHITEFIELD MACHINERY & PLANT LIMITED, 48, Chatham Street, Edgeley, Stockport.

SHOTBLASTING PLANT:

CONSTRUCTIONAL "Wizard" barrel type, size 44 × 40, with Dust Collector.
Tilghman Cabinet, 3 ft. × 3 ft. × 3 ft. 8 in. high, with Dust Arrestor, motorised fan.
Suitable AIR COMPRESSORS available for use with the above if required.

CORE STOVES:

Goodyear gas-fired, two-compartment, 10 ft. × 6 ft. × 6 ft.
Griffiths gas-fired, 6 ft. 10 in. × 3 ft. 10 in. × 5 ft. 2 in.

FURNACES:

MORGAN Type CA, 15-cwt. cap. Blower, etc., also with Oil Storage Tank.
Midland Monolithic Black Seam Type 3, take crucible about 16 in. dia., 30 in. deep.
Also other types and sizes, oil and gas firing.
PALLET MOULD CONVEYORS, 3 ft. 6 in. × 7 ft. 6 in. (48 Pallets) with M.S. plates with all gear and motor drives.

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MACHINERY FOR SALE - *contd.*

MODERN FURNACES "Traykor" type core stove complete with electric blower, coke fired, perfect condition. PORTER ENG. CO. LTD., Denton Street, Carlisle. 22341.

PATENTS

THE PROPRIETOR of Patent No. 697108 for "Improvements in or relating to Heat Regenerator Packing Materials" desire to secure commercial exploitation by Licence or otherwise in the United Kingdom. Replies to Hasletine Lake & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

SERVICES TO FOUNDRIES

CASTING WEIGHTS calculated from drawings. Excellent postal service covering U.K. ELCO, 30, Calthorpe Road, Walsall. GREat Bar 3623.

PROMPT ATTENTION given to metal, slag and refractory analysis. H. A. POWELL, Private Analyst, 53 Lathe Road, Rotherham.

CAPACITY WANTED

LONDON ENGINEERING COMPANY wish to thank all aluminium foundries who wrote to Box LE812. All replies will be most carefully considered.

IRON FOUNDRIES with machine-moulding capacity please send details to Box IF831, FOUNDRY TRADE JOURNAL.

CAPACITY AVAILABLE

CASTINGS.—We can save your porous castings, ferrous or non-ferrous, by an approved impregnation process; sample castings treated. A.I.D. approved.—RECUPERO, LTD., 66, South Harrow Viaduct, Harrow, Middlesex. 'Phone: Byron 1178.

VITREOUS ENAMELLING.—Capacity available for enamelling castings in all finishes (plain, mottle, marble, lustre, etc.). Prompt delivery by our own transport. THE RUSTLESS IRON CO., LTD., Trico Works, Keighley, Yorks. Tel.: Keighley 3737.

HEAT TREATMENT of Iron and Steel. Annealing, Normalising, Stress Relieving and Shotblasting. Prompt delivery by our own transport. THE RUSTLESS IRON CO., LTD., Trico Works, Keighley. Tel. Keighley 3737.

CAPACITY AVAILABLE for good quality grey iron castings, on B.M.M. AT4 moulding machine. Suitable for the following box sizes: 22 in. × 20 in.; 20 in. × 20 in.; 16 in. × 12 in.; 14 in. × 14 in. Call, write or telephone HILLSIDE FOUNDRY, LTD., Harriseahead, Stoke-on-Trent. Biddulph 3184.

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WANTED URGENTLY

Discarded Sacks, Slag Bags, Old Sacking.

For good prices and prompt settlement sell to actual users.

JOHN COTTON
(JUTE) LTD.
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FIREWOOD for Cupolas, Sleepers and Sleeper Wood in wagon loads.—TRACK SUPPLIES AND SERVICES, LTD., Wolverton, Bucks.

FOUNDRY MANURE. No Wood Shavings or Peat. Regular supplies, cheapest rates, delivered anywhere. SMALLMAN, Oakham Road, Dudley. Tel.: Dudley 52818.

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MATERIALS FOR SALE—*contd.*

CALCIUM SILICIDE. Finely ground Calcium Silicide—for nodular iron-exothermic compositions, etc. (now being successfully used by several foundries) at prices which save you money. TOXANE LIMITED, 47, High Street, Edgware, Middlesex. EDGware 6666.

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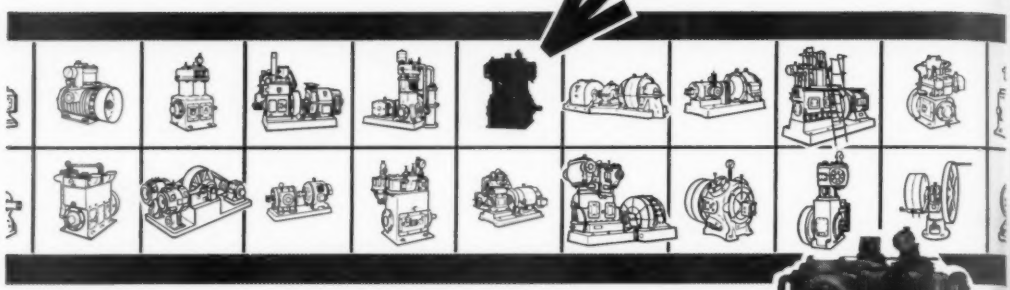

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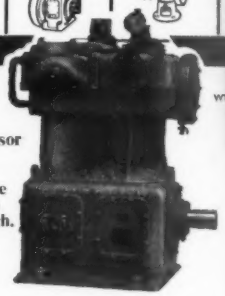

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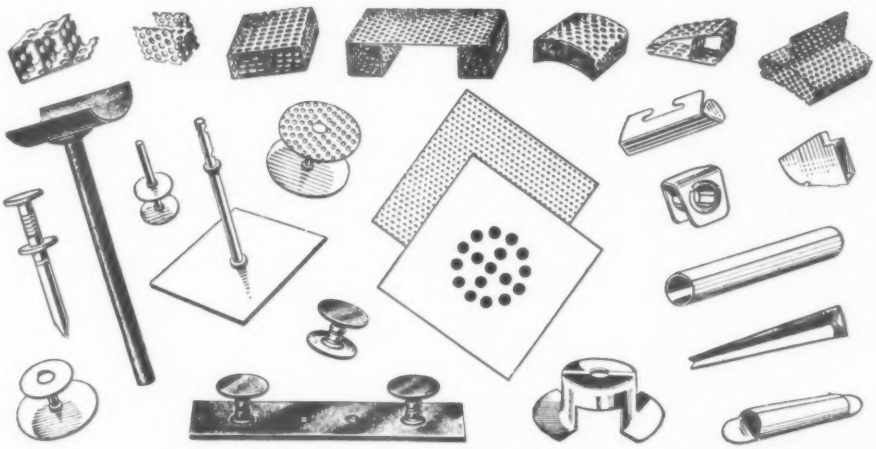

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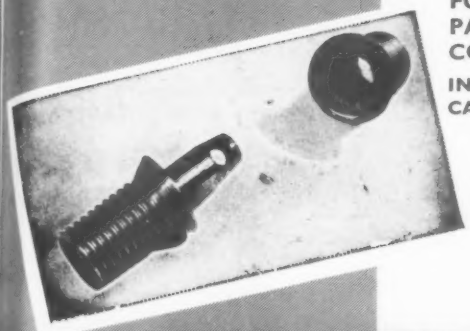

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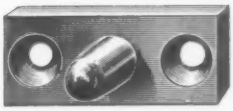

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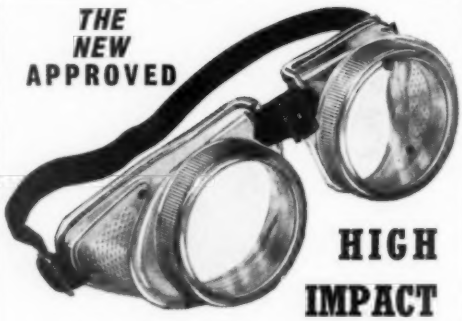

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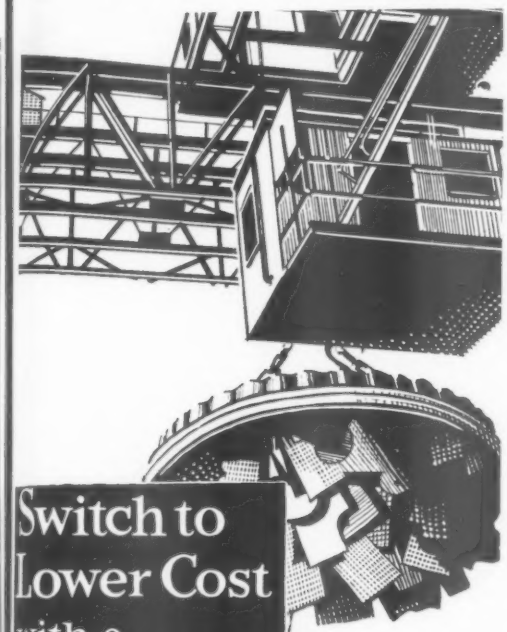

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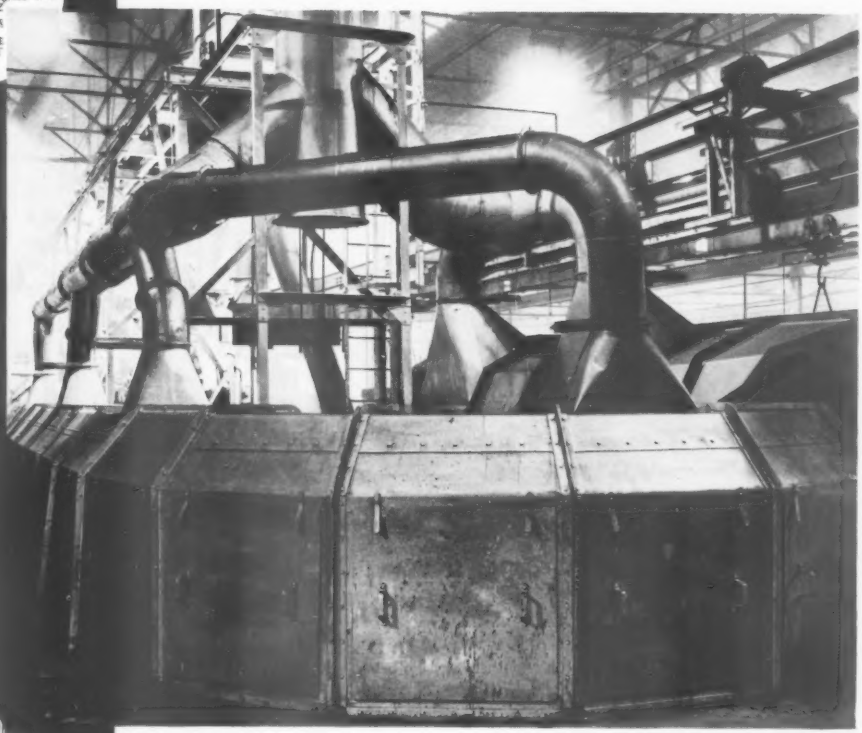

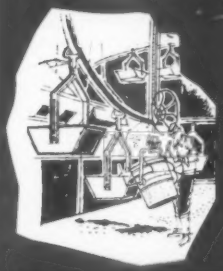

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